Les stéréotypes liés au vieillissement : antécédents, conséquences et modérateurs dans le domaine de l'activité physique

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Sous la co-direction du **Professeur Fabienne d'ARRIPE-LONGUEVILLE et d'Aïna CHALABAEV**

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SOMMAIRE

1 Introduction

Le nombre de seniors, définis par l'Organisation Mondiale de la Santé (OMS) comme les personnes âgées de 65 ans ou plus, ne cesse de croître. L'Organisation des Nations Unies (ONU) estime que cette population devrait atteindre 825 millions d'individus dans le monde en 2025, contre 315 millions en 1987. D'ici 2050, elle représentera 22% de la population mondiale (Scully, 2013 ; OMS, 2007) contre 11% en 2006. Parallèlement au vieillissement de la population, l'espérance de vie augmente. Selon l'Institut National de la Statistique et des Etudes Economiques (INSEE, 2013), à 60 ans les hommes peuvent espérer vivre 22,7 ans et les femmes 27,3 ans. Compte tenu de ce contexte démographique, le maintien de l'autonomie des personnes âgées est devenu depuis une dizaine d'années un véritable enjeu de santé publique, qui s'est traduit par plusieurs campagnes et mesures en faveur du « Bien Vieillir » (Aquino, 2007).

La sédentarité, définie par l'OMS comme *l'état dans lequel les mouvements sont réduits au minimum et la dépense énergétique proche de celle de repos,* apparaît comme un facteur important dans la diminution de la qualité de vie et de la santé des seniors (Katzmarzyk, 2010 ; Owen, Healy, Matthews, & Dustan, 2010).

Selon l'OMS, la sédentarité est un problème de santé publique mondial ; elle est considérée comme le quatrième facteur de risque de mortalité (6% de décès) et favorise le développement des maladies cardiovasculaires (*European Heart Network*, 1999) et du vieillissement accéléré (Thibaud et al., 2012). Inversement, plusieurs méta-analyses indiquent que l'activité physique régulière a des effets bénéfiques importants et prolongés sur la santé (i.e., état de complet bien-être physique, mental, et social, qui ne consiste pas seulement en une absence de maladie ou d'infirmité ; OMS, 1946) des seniors de 65 ans ou plus (Chou, Hwang, & Wu, 2012 ; Netz, Wu, Becker, & Tenenbaum, 2005 ; Ferrand, Martinent, & Durmaz, 2014 ; Vogel, Brechat, Leprêtre, Kaltenbach, Berthel, & Lonsdorfer, 2009). En effet, à partir du troisième âge, le corps se fragilise et le risque de chute ou de blessure devient plus important. Si la force musculaire, l'équilibre, la souplesse et la coordination ne sont pas entretenus, le facteur de risque augmente.

L'activité physique correspond, selon l'OMS à *tout mouvement corporel produit par les muscles du squelette qui exige une dépense d'énergie*, et englobe notamment les loisirs, les déplacements (i.e., la marche ou le vélo), les activités professionnelles, les tâches ménagères, les activités ludiques, les sports ou l'exercice planifié, dans le contexte quotidien, familial ou communautaire. Bien qu'elle ne puisse pas stopper le processus de vieillissement, sa pratique régulière permettrait de diminuer ou limiter la progression de maladies chroniques telles que les maladies cardiovasculaires (e.g., Manson et al., 2002), le cancer (e.g., Wolin, Yan, Colditz, & Lee, 2009), le diabète de type 2 (e.g., Eriksson, Taimela, & Koivisto, 1997), l'obésité (e.g., Olander, Fletcher, Williams, Atkinson, Turner, & French, 2013), et l'ostéoporose (e.g., Kelley, 1998 ; Layne & Nelson, 1999). L'activité physique contribuerait également au maintien des capacités fonctionnelles en prévenant les chutes et les

fractures (e.g., Fleming & Pendergast, 1993 ; Hu & Woollacott, 1994 ; Moor, Zimprich, Schmitt, & Kliegel, 2006) et des capacités cognitives des seniors (e.g., Colcombe & Kramer, 2003). La combinaison d'exercices aérobie et de résistance semble la plus efficace pour obtenir le maximum de bénéfices chez les seniors (Nelson et al., 2007). L'aquagym, le cyclisme, le golf, la gymnastique, la marche, la natation, le stretching, et le yoga sont des activités conseillées chez cette population par l'OMS.

D'autres études se sont plus particulièrement intéressées aux effets positifs de l'activité physique sur les affects (e.g., Arent, Landers, & Etnier, 2000 ; Legrand & Mille, 2009), les perceptions de soi (e.g., McAuley & Rudolph, 1995), et la qualité de vie (e.g., Rejeski & Mihalko, 2001 ; Chodzko-Zajko, Scwingel, & Park, 2009). L'activité physique serait également associée à des sentiments accrus de maîtrise de soi et d'efficacité, et elle renforcerait le lien social (Chodzko-Zajko et al., 2009). De plus, les seniors pratiquant une activité physique régulière de type aérobie et d'intensité modérée (e.g., marche ou nage) présenteraient moins de risque de souffrir de dépression (Salguero, Martínez-García, Molinero, & Márquez, 2011 ; Strawbridge, Deleger, Roberts, & Kaplan, 2002). L'activité physique semble donc être un facteur important d'un vieillissement réussi, en prévenant le déclin cognitif et fonctionnel associé au processus du vieillissement (Paterson & Warbutron, 2010 ; Renner, Spivak, Kwon, & Schwarzer, 2007 ; Warburton, Nicol, & Bredin, 2006).

Bien que la littérature scientifique indique de façon consistante qu'un mode de vie physiquement actif engendre des effets bénéfiques sur la santé des seniors, tant sur les plans physique que psychologique, cette population n'est pas suffisamment active au regard des recommandations actuelles de l'OMS qui préconise un minimum

de 150 minutes d'activité d'endurance d'intensité modérée ou au moins 75 minutes d'activité d'endurance d'intensité soutenue par semaine, ou une combinaison équivalente d'activité d'intensité modérée et soutenue. Il a ainsi été observé que la participation dans une activité physique diminue avec l'avancée en âge (Hughes, McDowell, & Brody, 2008). Au niveau mondial, près de 60% des seniors seraient physiquement inactifs (Hallal, Andersen, Bull, Guthold, Haskell, & Ekelund, 2012). Face à ce constat, l'identification des barrières, réelles ou perçues, et des facteurs facilitateurs de la pratique chez les seniors apparaît nécessaire.

Une récente revue de littérature (Baert, Gorus, Mets, Geerts, & Bautmans, 2011) a permis d'identifier 59 barrières freinant la pratique d'une activité physique et 61 motivateurs favorisant la pratique chez les seniors. D'une part, les auteurs ont identifié les barrières suivantes : (a) des barrières physiques en lien avec l'état de santé (e.g., douleur induite par l'activité physique, le surpoids, le manque d'équilibre, la sarcopénie, le manque de souffle) ; (b) des barrières environnementales et organisationnelles (e.g., absence de structures adaptées, les contraintes temporelles, les conditions climatiques) ; (c) des barrières psychologiques (e.g., le manque de temps, le manque de motivation, le manque d'intérêt, et le manque de soutien social). D'autre part, il a été montré que le soutien social, les bénéfices sur la santé, ainsi que le plaisir lié à la pratique étaient des motivateurs chez les seniors.

Bien que ces études nous informent quant à la nature des barrières en lien avec l'activité physique des seniors, elles sont souvent a-théoriques et ne permettent donc pas de comprendre les processus impliqués dans la régulation des comportements de santé, et plus particulièrement ceux liés à l'activité physique. Selon Matarazzo (1984), les comportements de santé peuvent être soit pathogènes (i.e., ils diminuent la santé,

par exemple la consommation d'alcool, de tabac) soit immunogènes (i.e., ils améliorent la santé, par exemple l'alimentation équilibrée, l'activité physique). Afin de comprendre les processus régulant les comportements de santé des auteurs se sont inscrits dans des modèles sociocognitifs tels que la théorie socio-cognitive (i.e. *SocioCognitive Theory*, ou SCT ; Bandura, 1986, 1997, 2004), la théorie du comportement planifié (i.e., *Theory of Planned Behavior*, ou TPB ; Ajzen & Madden, 1986), l'approche du processus d'action de la santé (i.e., *Health Action Process Approach* ou HAPA ; Schwarzer, 1992), ou encore la théorie de l'autodétermination (i.e., *Self-Determination Theory*, ou SDT, Deci & Ryan, 1985, 2000, 2002). Un point commun entre ces modèles est l'importance qu'ils accordent au sentiment d'auto-efficacité (i.e., *croyance en sa propre capacité à organiser et à exécuter les séries d'actions requises pour produire certains résultats* ; Bandura, 1977) ou à des concepts qui y sont associés.

Les travaux relatifs aux seniors ont majoritairement été conduits dans le cadre de la SCT qui considère l'auto-efficacité comme l'un des facteurs les plus proximaux de l'engagement. Ces travaux ont montré que l'auto-efficacité prédisait l'engagement dans l'activité physique chez les seniors à la fois directement (McAuley et al., 1999), et indirectement par le biais de l'attente de résultats positifs (Son, Kerstetter, Mowen, & Payne, 2009 ; White, Wójcicki, & McAuley, 2011 ; Williams, Anderson, & Winett, 2005 ; Wójcicki, White, & McAuley, 2009). Globalement, ces études ont indiqué que la SCT expliquait 17% à 40% de la variance des comportements liés à l'activité physique chez les seniors (Anderson, Winett, Wojcik, & Williams, 2010 ; McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003 ; Resnick, 2001 ; White et al., 2011).

Bien que la TPB ait été largement utilisée pour expliquer l'intention de faire de

l'exercice chez de nombreuses populations (Courneya, Blanchard, & Laing, 2001 ; Downs & Hausenblas, 2005 ; McEachan, Conner, Taylor, & Lawton, 2011), les études focalisées sur les seniors sont peu nombreuses. La TPB postule que les intentions comportementales sont déterminées par trois croyances : (a) les attitudes d'un individu envers un comportement (i.e., évaluations positives ou négatives de ce comportement et croyances dans son efficacité pour préserver ou améliorer la santé), (b) les normes sociales plus ou moins favorables au comportement que l'individu perçoit dans son entourage, et (c) le contrôle qu'il perçoit sur le comportement. L'auto-efficacité est considérée dans ce modèle comme une variable indépendante qui influencerait directement les intentions et les comportements. Les études ayant utilisé la TPB pour expliquer la pratique de l'activité physique des seniors ont permis d'expliquer 55 à 72% de la variance de l'intention d'être physiquement actif, mais uniquement 9 à 24% de la variance de la participation effective des seniors (Gretebeck, Black, Blue, Glickman, Huston, & Gretebeck, 2007 ; Lucidi, Grano, Barbanelli, & Violani, 2006 ; Scholz, Schüz, Ziegelmann, Lippke, & Schwarzer, 2008).

Des travaux récents se sont également inscrits dans le modèle HAPA qui intègre plusieurs modèles socio-cognitifs tels que la SCT (Bandura, 1986), la théorie de l'action raisonnée (Fishbein & Ajzen, 1975), et les théories de la volition (Heckhausen, 1991 ; Heckhausen & Gollwitzer, 1987) afin d'expliquer à la fois les intentions et les comportements liés à l'activité physique. L'apport principal du modèle HAPA réside dans la distinction entre deux phases : (a) la phase de motivation qui conduit à des intentions comportementales, et (b) la phase de volition qui conduit à des comportements de santé réels. Les résultats de ces travaux ont montré que le modèle HAPA expliquait 19 à 53% de la variance de l'intention d'être physiquement actif, et 20 à 49% de la variance des comportements liés à l'activité

physique des seniors (Caudroit, Stephan, & Le Scanff, 2011 ; Renner et al., 2007 ; Schwarzer, Luszczynska, Ziegelmann, Scholz, & Lippke, 2008 ; Ziegelmann & Lippke, 2007).

Enfin, quelques études se sont basées sur la SDT, qui vise à identifier les déterminants et conséquences de différents types de motivation à l'origine des comportements des individus, y compris l'activité physique des seniors. Cette théorie distingue six construits motivationnels placés sur un continuum théorique en fonction de leur degré relatif d'autodétermination, c'est-à-dire le degré auquel le comportement est fait par libre choix, ou à l'inverse, sous la contrainte extérieure, depuis la motivation intrinsèque jusqu'à l'amotivation, en passant par différents types de régulation de la motivation extrinsèque (i.e., la régulation introjectée, la régulation identifiée, la régulation externe ; Deci & Ryan, 2002). Dans le domaine de l'activité physique, de nombreuses études ont montré que la motivation autodéterminée constituait un facteur favorable au maintien de l'engagement dans une activité physique (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997 ; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). Concernant la population spécifique des seniors, il a également été montré que la motivation intrinsèque était associée à un niveau accru d'activité physique (Dacey, Baltzell, & Zaichkowsky, 2008 ; Kolt, Driver, & Giles, 2004 ; Stiggelbout, Hopman-Rock, & Mechelen, 2008). Stiggelbout et al. (2008) ont indiqué que la motivation autodéterminée expliquait 56% de la variance des comportements liés à l'activité physique. Une étude de Stephan, Boiché, et Le Scanff (2010) a révélé que des femmes âgées qui avaient abandonné la pratique d'une activité physique présentaient des niveaux plus faibles de motivation autodéterminée (i.e., motivation intrinsèque et régulation identifiée) et des niveaux plus élevés de régulation externe et d'amotivation que celles qui avaient persisté dans la pratique

d'une activité physique.

En résumé, la SCT et la SDT ont été majoritairement utilisées pour expliquer les comportements liés à l'activité physique, alors que la TPB et le modèle HAPA l'ont été à la fois pour expliquer l'intention d'être physiquement actif et les comportements liés à l'activité physique. Malgré le nombre faible d'études basées sur la SDT, cette théorie est considérée comme un socle théorique novateur qui permettrait d'une part, de mieux comprendre les mécanismes motivationnels, et d'autre part de prédire le maintien de l'engagement des seniors dans l'activité physique par le biais des caractéristiques motivationnelles de l'individu. Bien que l'ensemble de ces modèles s'avèrent utiles pour comprendre l'engagement dans des comportements de santé ainsi que leur maintien, ils ne prennent pas en considération les caractéristiques propres aux seniors, notamment au regard de leur inactivité physique élevée. Il semble donc nécessaire de prendre en compte les spécificités liées au fait d'appartenir à la catégorie des seniors, afin d'obtenir une compréhension plus fine des déterminants psychosociaux qui pèsent sur leurs comportements en matière d'activité physique. Récemment, cette dimension a été prise en compte dans des modèles centrés sur le concept de stéréotype, comme le modèle du *stereotype embodiment* de Levy (2009). Ce concept est central dans ce travail doctoral.

Les stéréotypes peuvent être définis comme des croyances partagées concernant les caractéristiques personnelles, généralement des traits de personnalité, mais souvent aussi des comportements, d'un groupe de personnes (Leyens, Yzerbyt, & Schadron, 1996). Selon Levy (2009), les seniors feraient l'objet de stéréotypes négatifs liés au vieillissement et au déclin physique qui lui est associé. L'impression de « ne pas être capable de faire du sport » ou celle « d'être en mauvaise santé » sont

des raisons majeures évoquées par les seniors concernant leur manque d'engagement dans l'activité physique (Booth, Bauman, Owen, & Gore, 1997 ; Booth, Bauman, & Owen, 2002 ; Trost, Owen, Bauman, Sallis, & Brown, 2002). Dans ce domaine, les stéréotypes sont généralement négatifs (Netz & Raviv, 2004).

En lien avec la théorie de Levy (2009), quelques études récentes ont suggéré que l'internalisation de stéréotypes négatifs (i.e., relatifs à la santé, à l'activité sociale ou à la personnalité) serait associée à un faible engagement dans l'activité physique chez les seniors (Sánchez Palacios, Torres, & Blanca Mena, 2009). Une étude menée par Cuddy, Norton, et Fiske (2005) a montré que les seniors étaient perçus par les autres comme peu compétents ; ces stéréotypes seraient résistants et donc difficiles à changer. Cette étude suggère également que ces stéréotypes auraient un rôle dans le faible taux d'engagement de cette population dans une pratique physique régulière. D'autres travaux ont également indiqué que l'internalisation de ces stéréotypes par les seniors se traduit par des attitudes plus négatives envers leur propre vieillissement, une baisse du sentiment de compétence et une perception négative de l'activité physique (Netz & Raviv, 2004 ; Wilcox & Storandt, 1996). En se basant sur ces résultats, la question qui est posée dans ce travail doctoral est de savoir si les stéréotypes liés à la pratique de l'activité physique chez les seniors pourraient affecter les comportements de santé, et plus particulièrement, ceux liés à l'activité physique chez les seniors physiquement inactifs et actifs.

Cette thèse s'articule autour de deux grandes parties. La première partie est consacrée à l'exposé du cadre théorique général. Le premier chapitre a pour objectif de définir l'origine et la nature des stéréotypes, et de montrer qu'ils peuvent affecter, notamment par leur internalisation, les comportements de santé des individus ciblés

par des stéréotypes, et plus particulièrement des seniors. Le deuxième chapitre s'intéresse aux différents antécédents psychosociaux de l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique. Enfin, un troisième chapitre examine les études s'intéressant aux stratégies permettant de limiter l'impact des stéréotypes.

La deuxième partie de ce travail doctoral présente le programme de recherche qui est constitué de cinq études. La première étude fait partie d'un programme de recherche visant à élaborer et valider une mesure des stéréotypes liés à la pratique de l'activité physique chez les seniors. Le double objectif de la deuxième étude est (a) de mieux comprendre les corrélats personnels (i.e., l'ouverture aux expériences et les théories implicites de l'habileté) de l'internalisation des stéréotypes liés au vieillissement, et (b) d'examiner les relations entre ces corrélats et le niveau d'activité physique chez les seniors. La troisième étude a pour objectif d'examiner si l'adhésion aux stéréotypes liés au vieillissement peut prédire la santé par d'autres voies d'influence que celle de l'intériorisation dans le Soi, en diminuant la vitalité subjective chez des seniors actifs, illustrant ainsi un effet *d'ego depletion*. La quatrième étude est une étude expérimentale dont le but est d'examiner dans quel contexte (i.e., stéréotypique *vs.* contre stéréotypique) les théories implicites de l'habileté seraient les plus efficaces sur une tâche de force musculaire chez les seniors. Enfin, la dernière étude de ce travail doctoral est une étude interventionnelle examinant les effets d'une activité de marche hebdomadaire supervisée et individualisée sur les stéréotypes liés au vieillissement dans le domaine de l'activité physique.

1ère Partie : CADRE THEORIQUE

CHAPITRE 1

Le rôle des stéréotypes dans les comportements de santé

L'objectif de ce chapitre est de présenter les études qui se sont focalisées sur le rôle des stéréotypes dans les comportements de santé. Dans la première partie de ce chapitre, nous définirons la nature et l'origine des stéréotypes. Ensuite, nous présenterons les principaux processus d'influence des stéréotypes liés au vieillissement qui ont été étudiés en psychologie sociale ces dernières années : d'une part, les processus liés à leur internalisation dans le Soi (illustrés dans le cadre de la théorie du *Stereotype Embodiment* de Levy, 2009) ; d'autre part, les processus liés à la menace du stéréotype (*Stereotype Threat*, Steele, 1997).

1.1. Définition des stéréotypes

Le terme « stéréotype » (du grec, *stereos*, solide, et *tupos*, empreinte) a d'abord été utilisé en imprimerie (Didot, 1798). C'est Walter Lippmann, journaliste et auteur du livre *Public Opinion*, qui lui donna en 1922 son acceptation socio-psychologique. Il voulut ainsi insister sur le caractère rigide des images que nous avons du monde qui nous entoure, et plus particulièrement des groupes sociaux. Selon Lippmann (1922), les stéréotypes nous permettent de gérer l'environnement réel qui est à la fois *trop grand, trop complexe, et trop évanescent pour une connaissance directe*. Katz et Braly (1935) ont ensuite décrit les stéréotypes comme *une impression figée très peu conforme aux faits qu'elle prétend représenter et qui résulte de notre tendance à définir d'abord et à observer ensuite*. Plus tard, Allport (1954) les a définis comme *une attitude négative envers les membres d'un groupe social, uniquement motivée par son appartenance au groupe*, les renvoyant par conséquent à des croyances négatives et incorrectes résultant de préjugés envers un groupe. Dans le domaine de la psychologie sociale, les préjugés et les stéréotypes sont des processus sociocognitifs qui font l'objet de nombreuses études. Allport (1954) définit ainsi les préjugés comme *une attitude négative ou une prédisposition à adopter un comportement négatif envers un groupe, ou les membres de ce groupe, qui repose sur une exagération erronée et rigide*. Même si les préjugés et les stéréotypes sont des synonymes dans le langage commun, il est important de bien les distinguer.

Selon l'approche sociocognitive (Fiske & Taylor, 1991), les stéréotypes résulteraient du fonctionnement cognitif limité des individus, les incitant à utiliser des « raccourcis mentaux » afin de se former une impression d'autrui. Ainsi, les stéréotypes feraient référence à la composante cognitive des attitudes intergroupes,

tandis que les préjugés renverraient à leur composante affective. Les stéréotypes ne seraient donc pas nécessairement associés aux préjugés et ne seraient pas inévitablement incorrects ou négatifs. Cette approche s'illustre dans la définition proposée par Ashmore et Del Boca (1981), pour qui les stéréotypes sont *un ensemble structuré de croyances à propos des attributs personnels d'un groupe de personnes*, ou dans celle de Leyens et al. (1996), pour qui les stéréotypes feraient référence à des *croyances partagées concernant les caractéristiques personnelles, généralement des traits de personnalité, mais souvent aussi des comportements, d'un groupe de personnes*. Pour Van Knippenberg et Dijksterhuis (2000), les stéréotypes seraient des *représentations mentales au sein desquelles des catégories sociales sont associées à des traits (stéréo)typiques de cette catégorie*.

Ces différentes définitions illustrent des divergences quant à l'origine de la formation des stéréotypes. Les stéréotypes sont considérés par certains auteurs comme des éléments de la culture de la société, appris par l'individu au cours de la socialisation. Selon cette approche, le comportement social est déterminé par les normes et les valeurs d'un milieu, et ne se limite pas aux motivations et cognitions individuelles. Les stéréotypes seraient donc envisagés comme étant collectifs par nature. Yzerbyt et Schadron (1996) illustrent cette notion de partage au travers d'une boutade relative aux stéréotypes attachés aux différentes nations européennes : *Le paradis est l'endroit où les Français sont les cuisiniers, les Italiens sont les amants, les Anglais sont les policiers, les Allemands sont les travailleurs, et le tout est organisé par les Suisses vs. L'enfer est l'endroit où les Anglais sont les cuisiniers, les Suisses sont les amants, les Allemands sont les policiers, les Français sont les travailleurs, et le tout est organisé par les Italiens*. Pour d'autres auteurs, la nature collective des stéréotypes ne serait pas une caractéristique centrale de ce concept

(Hamilton, 1981), ce dernier étant considéré comme une manifestation normale du fonctionnement cognitif limité de l'individu. Toutefois, de nombreux auteurs mettent en avant la difficulté de distinguer les parts culturelles et individuelles dans la formation des stéréotypes (Schneider, 2005). Certains proposent alors de distinguer les stéréotypes personnels des stéréotypes culturels (Devine, 1989). Dans ce travail doctoral, nous avons pris en compte cette distinction en nous intéressant à la fois à l'influence des stéréotypes personnels (i.e., opérationnalisés au travers du degré d'adhésion de l'individu aux stéréotypes culturels ; Levy, 2009), et à celle des stéréotypes culturels (i.e., dans le cadre de la menace du stéréotype) sur des comportements de santé liés à l'activité physique des seniors.

1.2. Le contenu des stéréotypes associés aux seniors

Jusqu'au XIX^{ème} siècle, l'espérance de vie moyenne était beaucoup moins élevée que de nos jours (i.e., 45 ans en moyenne ; Institut National des Etudes Démographiques, 2006). Les seniors étaient alors peu nombreux, considérés comme prudents, intelligents et sages, et représentaient la tradition et la transmission des expériences (Lehr & Schneider, 1984). Plus tard, grâce aux progrès de la médecine, les seniors sont de plus en plus nombreux et ont une meilleure espérance de vie. L'image généralisée de cette avancée en âge est principalement associée à des diminutions psychophysiques (i.e., maladie, handicap, fatigue, mauvaise mémoire, isolement ; Müller, Wertheimer, & Baumann, 1981).

De nombreuses études ont recensé les stéréotypes associés aux seniors. Par exemple, les seniors seraient des individus qui ne se sentent pas en sûreté, vivent de leurs souvenirs, répètent souvent les mêmes choses, prennent beaucoup de

médicaments, ont une santé fragile, ont peur de l'avenir, et parlent beaucoup (Hétu, 1988). Brewer et Lui (1984) ont mis en évidence trois sous-catégories de stéréotypes associés à la vieillesse : (a) le grand-parent (i.e., vieux jeu, traditionnel) ; (b) le vieil homme d'Etat (i.e., autoritaire, conservateur, digne) ; et le citoyen senior (i.e., isolé, inquiet, faible). Schmidt et Boland (1986) ont recensé huit sous-catégories négatives (i.e., abattu, légèrement handicapé, vulnérable, très handicapé, mégère, bourru, reclus, voisin bruyant, mendiant) et quatre positives (i.e., conservateur, patriarche libéral, grand-parent parfait, sage). Être âgé est également associé à des stéréotypes sociaux négatifs tels que le fait d'être sénile, grincheux, rigide, confus, faible et sans mémoire (Hummert, 1990 ; Hummert, Garstka, O'Brien, Greenwald, & Mellott, 2002).

Par ailleurs, d'autres études ont montré que deux dimensions caractériseraient le contenu des stéréotypes liés au vieillissement : la compétence et la chaleur (Cuddy & Fiske, 2002 ; Donlon, Ashman, & Levy, 2005 ; Fiske, Cuddy, Glick, & Xu, 2002 ; Kite, Stockdale, Whitley, & Johnson, 2005). D'une part, la compétence (i.e., capacités, indépendance) est jugée négativement, le vieillissement étant associé à une diminution des capacités physiques et cognitives (Rubin & Brown, 1975). D'autre part, la chaleur est jugée positivement. Comparativement aux jeunes, les seniors sont jugés comme plus chaleureux et conviviaux (Andreoletti, Maurice, & Whalen, 2001). De plus, les individus auraient tendance à attribuer aux seniors des défaillances au niveau de la mémoire et de l'attention (Erber & Prager, 1999 ; Erber, Prager, Williams, & Caiola, 1996).

Selon Cuddy et al. (2005), ces stéréotypes seraient très répandus, résistants et donc difficiles à changer. Cependant, plusieurs études ont montré que certaines

variables pouvaient influencer le contenu de ces stéréotypes. Ainsi, les seniors exerçant une profession seraient jugés autant ou plus compétents que les jeunes (McCann & Giles, 2002). D'autre part le genre aurait également une influence. Ainsi, d'une manière générale, les femmes âgées constitueraient une population doublement stigmatisée. Les femmes âgées souffriraient de stéréotypes négatifs liés au genre. Une méta-analyse a indiqué que les femmes âgées étaient des personnes vulnérables avec un niveau élevé de veuvage et un bien-être subjectif bas (Pinquart & Sörensen, 2001). Les femmes âgées souffriraient également de stéréotypes plus généraux liés au vieillissement (Cuddy et al., 2005).

Dans la partie suivante, nous verrons les travaux qui se sont intéressés à la confirmation comportementale de ces stéréotypes.

1.3. Les différentes formes de stéréotypes

Dans la littérature sur la confirmation comportementale des stéréotypes, plusieurs formes de stéréotypes sont étudiées ; les stéréotypes explicites qui opèrent de façon consciente, intentionnelle et contrôlée, et les stéréotypes implicites qui opèrent de façon inconsciente, spontanée, et relativement automatique.

Des études expérimentales ont ainsi démontré que les stéréotypes peuvent influencer le comportement de façon inconsciente (e.g., Levy, 1996, 2003). Par exemple, Levy (1996) a observé que flasher de façon subliminale sur un écran d'ordinateur des mots liés à des stéréotypes négatifs conduisait des participants à adopter une écriture perçue comme étant celle d'une personne âgée. Des résultats similaires sont observés lorsque les stéréotypes sont activés de façon explicite, par exemple en présentant un groupe social comme inférieur aux autres sur une tâche motrice (e.g., « les femmes obtiennent de moins bons résultats que les hommes sur

une tâche de force » ; Chalabaev, Sarrazin, Fontayne, Boiché, & Clément-Guillotin, 2013), ou encore sur une tâche cognitive (e.g., Cadinu, Maass, Frigerio, Impagliazzo, & Latinotti, 2003 ; Hess, Hinson, & Hodges, 2009). Une autre étude de Levy, Slade et Gill (2006) a activé explicitement les stéréotypes liés au vieillissement en demandant à des seniors d'associer des mots ou des phrases à la population générale des seniors. Cette étude a révélé que les seniors associant des perceptions essentiellement négatives à leur vieillissement avaient une baisse plus importante de l'audition. Ainsi, il semble que quel que soit le mode d'activation des stéréotypes (i.e., explicite ou implicite), le comportement des individus de façon générale, et la santé physique et cognitive des seniors en particulier, peuvent s'en trouver affectés. Ce travail doctoral portera principalement sur l'influence des formes explicites des stéréotypes, dans le cadre de la théorie de l'incorporation des stéréotypes de Levy (2009).

1.4. La théorie de l'internalisation des stéréotypes (Levy, 2009)

1.4.1. Présentation générale du modèle

Selon Levy (2009), l'internalisation des stéréotypes se fait tout au long de la vie et aurait des effets à long terme sur l'état de santé des seniors. Les effets de ces stéréotypes liés au vieillissement sur les fonctions cognitives et physiques commencent à être documentés dans la littérature scientifique (e.g., Levy, 1996 ; Levy, Hausdroff, Hencke, & Wei, 2000 ; Levy, Slade, & Kasl, 2002 ; Wurm, Tesch-Römer, & Tomasik, 2007). Trois étapes seraient nécessaires dans le processus d'internalisation des stéréotypes : (a) les stéréotypes liés au vieillissement seraient internalisés dès le plus jeune âge ; (b) lorsque l'individu devient senior, il appliquerait à lui-même ces stéréotypes ; (c) ces stéréotypes appliqués à soi-même seraient ensuite activés consciemment et inconsciemment pour exercer leurs effets sur la

santé des individus. Ainsi, l'adhésion aux stéréotypes se ferait dès l'enfance, ce processus étant facilité par l'absence de mécanismes de résistance du Soi, car ces stéréotypes ne sont pas pertinents pour l'identité personnelle de ceux qui ne sont pas concernés par ces derniers (Levy & Banaji, 2002). Mais la particularité du groupe des seniors est qu'il s'agit d'un groupe d'abord extérieur à soi qui devient inévitablement un endogroupe pour les personnes qui vivent suffisamment longtemps. Les stéréotypes liés au vieillissement qui sont initialement externes à l'individu (i.e., non pertinents par rapport à soi) seraient alors dirigés vers l'individu lui-même avec l'avancée en âge (i.e., pertinents par rapport à soi ; Levy, 2003 ; Rothermund, 2005). Ces stéréotypes continueraient d'être majoritairement négatifs (Nosek, Banaji, & Greenwald, 2002) et exerceraient des influences négatives sur la santé cognitive et physique, même si des stéréotypes positifs existent également, influençant positivement la santé (Levy & Langer, 1994). Les stéréotypes dirigés vers soi affecteraient alors les perceptions de son propre vieillissement (i.e., on parle d'internalisation ou d'intériorisation des stéréotypes, Levy, 2009), qui prédiraient en retour la santé en influençant l'adoption de comportements de santé des seniors.

Les stéréotypes exerceraient leur influence selon trois mécanismes : psychologiques, comportementaux et physiologiques (Levy, 2009). La voie psychologique s'opèrerait via des anticipations auto-réalisatrices (Levy et al., 2002 ; Levy & Banaji, 2002). La voie comportementale serait illustrée par les pratiques de santé. Ainsi, les seniors qui ont une perception négative de leur vieillissement considéreraient que les problèmes de santé sont le reflet inévitable de la vieillesse. Cette perception peut alors conduire les seniors à considérer les comportements de santé comme futiles (Levy & Myers, 2004), et entraînerait une diminution de l'auto-efficacité (Levy, Ashman, & Dror, 2000). Enfin, la voie physiologique impliquerait le

système nerveux autonome qui correspond à une branche du système nerveux central répondant à un stress environnemental. L'étude de Levy et al. (2002) a montré, par exemple, que des seniors qui étaient exposés à des stéréotypes négatifs liés au vieillissement lors de la résolution d'un problème mathématique avaient une réponse cardiovasculaire provoquée par un stress plus élevée comparativement à ceux exposés à des stéréotypes positifs.

1.4.2. Les perceptions de son vieillissement et leurs conséquences sur la santé

Le processus par lequel les individus développent leurs perceptions de leur propre vieillissement reposerait sur deux étapes. Tout d'abord, les expectations (i.e., attentes) liées au vieillissement seraient internalisées avant que l'individu ne devienne senior. Ces attentes se construiraient au travers des rencontres que les individus font dans leur vie quotidienne, et des perceptions que cela engendre. Ainsi, les perceptions négatives liées au vieillissement deviendraient des attentes négatives ou des prédictions sur la façon dont le processus lié au vieillissement de l'individu est susceptible d'être vécu.

De nombreuses études ont rapporté que les perceptions positives de son vieillissement avaient des effets bénéfiques sur la santé. En effet, les perceptions positives de son vieillissement seraient reliées à un meilleur fonctionnement physique (i.e., équilibre, vitesse de marche ; Sargent-Cox, Anstey, & Luszcz, 2012), une longévité accrue (Levy, Slade, Kundel, & Kasl, 2002 ; Sargent-Cox, Anstey, & Luszcz, 2013), une meilleure santé fonctionnelle (Levy et al., 2002) et à des comportements de santé sains (e.g., adoption d'une alimentation équilibrée, activité physique régulière ; Levy & Myers, 2004). A l'inverse, les seniors qui présentent des

perceptions négatives de leur vieillissement considèreraient le déclin de leurs capacités cognitives et fonctionnelles (Netz et al., 2005) comme un processus inévitable, et seraient donc plus susceptibles de considérer les comportements liés à la santé comme inutiles (e.g., Levy & Myers, 2004).

Parallèlement aux mécanismes liés à l'intériorisation des stéréotypes dans les perceptions de soi, les travaux sur la menace du stéréotype indiquent qu'une autre voie d'influence des stéréotypes existerait (e.g., Chasteen et al., 2005 ; Hess, Auman, Colcombe, & Rahhal, 2003). Selon la théorie de la menace du stéréotype (Steele, 1997), la pression générée par les stéréotypes affecterait négativement la performance des individus. Cette menace reposerait sur des processus différents de ceux de l'internalisation des stéréotypes puisqu'elle concerne surtout les personnes qui n'ont pas internalisé les stéréotypes dans le Soi (Steele, 1997).

1.5. La menace du stéréotype

Steele et Aronson (1995) ont été les premiers à observer le phénomène de menace du stéréotype et son influence sur la performance académique et les comportements des individus stéréotypés (i.e., Afro-Américains). Cette théorie postule qu'un individu se trouvant dans une situation où il est susceptible d'être jugé, sur la simple base d'un stéréotype existant à propos de son groupe, va adopter les caractéristiques comportementales et/ou cognitives conformes aux prédictions inférées par le stéréotype. Selon Steele et Aronson (1995), l'existence d'un stéréotype constituerait d'ores et déjà une menace pour l'individu appartenant à un groupe stéréotypé ; cette menace irait alors interférer avec le fonctionnement intellectuel, et ainsi altérer les performances relatives à une tâche donnée. En effet, une fois rendus cognitivement accessibles, certains stéréotypes négatifs conduiraient ceux qui en sont

la cible à craindre de confirmer, à leurs propres yeux ou aux yeux d'autrui, les faiblesses et autres traits négatifs supposés caractériser leur groupe d'appartenance. Par conséquent, cette crainte interfèrerait avec leur performance et renforcerait le stéréotype en cause (Steele & Aronson, 1995). En d'autres termes, le simple fait d'être conscient de l'existence d'un stéréotype négatif à l'égard de son propre groupe pourrait suffire pour en subir les conséquences négatives.

Différents types d'activation de la menace du stéréotype existent : (a) flagrante (i.e., le message impliquant un stéréotype est explicitement transmis à l'individu ; Aronson, Lustina, Good, Keough, Steele, & Brown, 1999 ; Cadinu et al., 2003) ; (b) indirecte et stable (i.e., le message est transmis implicitement ; Steele & Aronson, 1995). Dans ce dernier cas, le protocole le plus fréquemment utilisé consiste à proposer une tâche à des sujets ciblés par des stéréotypes négatifs (e.g., Steele & Aronson, 1995 ; Desert, Croizet, & Leyens, 2002). Cette tâche est présentée à un premier groupe comme évaluant la compétence stéréotypée (condition diagnostique), ou une autre compétence non reliée au stéréotype (condition non diagnostique). Un effet de menace du stéréotype est alors observé lorsque dans la condition diagnostique, les performances sont plus basses que dans la condition non diagnostique.

De nombreuses études se sont intéressées aux mécanismes responsables des effets de cette menace sur la performance des individus stéréotypés. Dans un premier temps, les médiateurs les plus fréquemment étudiés ont été : (a) l'anxiété (Spencer, Steele, & Quinn, 1999 ; Ben-Zeev, Fein, & Inzlicht, 2005 ; Schmader, 2002) ; (b) le sentiment d'auto-efficacité (Spencer et al., 1999) ; (c) les attentes de performances (Brown & Josephs, 1999) et ; (d) l'appréhension de l'évaluation (Spencer et al., 1999 ;

Aronson et al., 1999). Puis Schmader, Johns et Forbes (2008) ont synthétisé ces travaux en recensant trois principaux mécanismes étroitement liés : (a) une réponse physiologique lié au stress ; (b) une tendance à surveiller activement la performance ; et (c) les efforts visant à supprimer les pensées et émotions négatives.

La menace du stéréotype a été étudiée sur de nombreux groupes sociaux porteurs de stéréotypes. Ce phénomène concerne les stéréotypes liés à l'appartenance ethnique et raciale (Steele & Aronson, 1995 ; Stone, Lynch, Sjomeling, & Darley, 1999), au genre (Spencer et al., 1999 ; Brown et al., 1999 ; Leyens, Desert, Croizet, & Darcis, 2000), au statut socio-économique (Croizet & Claire, 1998), ou bien encore à l'âge (Levy, 1996). Il est actuellement bien établi dans la littérature que la menace du stéréotype influencerait les performances cognitives des seniors. Une étude de Hess et al. (2003) portant sur l'influence des stéréotypes sur les performances cognitives, a révélé que l'une des conséquences du vieillissement concernait les compétences cognitives, et plus particulièrement les déficiences de la mémoire des seniors. Une méta-analyse de Horton, Baker, Pearce et Deakin (2008) a recensé les études montrant que les seniors exposés à des stéréotypes négatifs liés au vieillissement obtenaient de moins bonnes performances mnésiques comparativement à ceux qui étaient exposés à des stéréotypes positifs. Les seniors sembleraient être plus sensibles aux effets de la menace du stéréotype (O'Brien & Hummert, 2006), notamment quand ils sont instruits (Hess et al., 2009), perçoivent la menace du stéréotype (e.g., Kang & Chasteen, 2009), ont une conscience élevée du stigma (i.e., degré auquel les individus pensent au quotidien que les autres interprètent leurs comportements en fonction des stéréotypes négatifs relatifs à leur groupe d'appartenance ; Brown & Pinel, 2003), et valorisent leurs capacités mnésiques (Hess et al., 2003).

La menace du stéréotype a été appliquée à des tâches variées, comme les mathématiques (e.g., Quinn & Spencer, 2001), les tâches verbales (e.g., Cadinu et al., 2003) mais plus rarement dans les tâches motrices (e.g., Stone et al., 1999). Dans le domaine particulier de l'activité physique, quelques études ont montré que l'activation de stéréotypes liés au genre influençait négativement la performance physique de jeunes adultes (Chalabaev, Brisswalter, Radel, Coombes, Easthope, & Clément-Guillotin, 2013 ; Chalabaev, Stone, Sarrazin, & Croizet, 2008) des individus. En revanche, les études portant sur la population des seniors sont quasi inexistantes.

1.6. Synthèse

Bien que les stéréotypes soient définis de différentes manières, il existe un consensus concernant leur influence positive ou négative sur les comportements de santé des individus. La théorie du *Stereotype Embodiment* (Levy, 2009) permettrait de comprendre comment les stéréotypes négatifs liés au vieillissement, internalisés tout au long de la vie, influencent les comportements de santé des seniors. Par ailleurs, la théorie de la menace du stéréotype (Steele & Aronson, 1995) serait susceptible de renforcer ces effets néfastes majoritairement rapportés à ce jour sur le fonctionnement cognitif des seniors. Dans le domaine particulier de l'activité physique, le contenu des stéréotypes liés au vieillissement n'est pas clairement identifié ni mesuré, et la manière dont ces stéréotypes pourraient influencer l'engagement des seniors dans l'activité physique est encore méconnue à ce jour.

CHAPITRE 2

Antécédents de l'internalisation des stéréotypes dans le Soi

L'objectif de ce chapitre est de présenter les antécédents potentiels de l'internalisation des stéréotypes dans le Soi. Alors que la plupart des études se sont intéressées aux conséquences de cette internalisation sur la santé, très peu ont cherché à comprendre les facteurs expliquant pourquoi les seniors varient dans leur degré d'internalisation des stéréotypes. Nous développerons ici trois déterminants potentiels : le degré d'adhésion aux stéréotypes, les traits de personnalité, et les théories implicites de l'habileté. Etant donné le peu de travaux ayant examiné leurs relations avec les perceptions de son vieillissement, nous présenterons principalement des études ayant porté sur leurs relations avec les comportements de santé en général et d'activité physique en particulier.

2.1. L'adhésion aux stéréotypes en tant que prédicteur des comportements de santé

L'adhésion aux stéréotypes liés au vieillissement serait liée à l'adoption de comportements de santé tels que l'alimentation, la consommation d'alcool et de tabac (Levy & Myers, 2004), et la longévité (Levy et al., 2002). En effet, plusieurs études de Levy et collaborateurs ont révélé que les seniors ayant des stéréotypes positifs liés au vieillissement avaient tendance à récupérer plus rapidement d'un évènement cardiovasculaire (Levy, Slade, Mai & Caracciolo, 2006) ou d'un handicap (Levy, Slade, Murphy, & Gill, 2012), avaient une meilleure mémoire (Levy, Zonderman, Slade, & Ferrucci, 2012) et une meilleure audition (Levy et al., 2006) que ceux adhérant à des stéréotypes négatifs. Plusieurs études ont également mis en évidence que les stéréotypes positifs ou négatifs liés au vieillissement avaient des effets positifs ou négatifs sur de nombreux facteurs physiques et cognitifs. De plus, l'évocation de stéréotypes positifs liés au vieillissement engendrerait des effets favorables sur le sentiment d'auto-efficacité, l'image de soi des personnes âgées (Levy, 1996 ; Levy et al., 2000). Il a été observé que plus les individus endossaient des stéréotypes liés au vieillissement négatifs, plus leur concept de soi se détériorait au fil des années (Rothermund & Brandstädter, 2003). L'adhésion à des stéréotypes négatifs sur le vieillissement peut engendrer une évaluation négative de la personne (Auman, Bosworth, & Hess, 2005), augmenter le stress cardiovasculaire (Levy et al., 2000), ralentir les fonctions motrices (Hausdorff, Levy, & Wei, 1999), et aller jusqu'à raccourcir l'espérance de vie (Levy et al., 2002).

Etant donné l'ensemble de ces résultats, il nous semble que le degré d'adhésion aux stéréotypes pourrait être un prédicteur important de leur intériorisation dans les perceptions de soi, affectant en retour les comportements de santé de l'individu.

2.2. Traits de personnalité, perceptions du vieillissement et facteurs de santé

Un autre prédicteur potentiel de l'intériorisation des stéréotypes fait référence aux traits de personnalité. Cox (2005) définit la personnalité comme *l'ensemble des comportements régulièrement affichés par une personne et qui permettent de la distinguer d'autrui, plus particulièrement dans des situations de contact social*. Selon Morizot et Miranda (2007), les traits de personnalité seraient des *construits latents qui constituent l'expression phénotypique du bagage génotypique*. Plus particulièrement, les traits de personnalité traduiraient des indicateurs cognitifs, émotionnels et comportementaux. Leur approche est dite dimensionnelle (i.e., caractéristiques à partir desquelles tous les individus d'une population pourront être comparés les uns par rapport aux autres).

Allport est considéré comme l'un des pères du modèle en cinq facteurs de la personnalité (*Five Factor Model* ; FFM). Allport et Odbert (1936) ont identifié quatre catégories principales : (a) les traits de personnalité ; (b) les états temporaires, humeurs ; (c) les jugements évaluant les conduites personnelles et la réputation des personnes et ; (d) les caractéristiques physiques, capacités, talents. Cattell (1956) utilisa cette catégorisation comme point de départ de son modèle multidimensionnel de la personnalité. Il fut l'un des premiers à construire et valider un questionnaire d'auto-évaluation comprenant 16 facteurs primaires de la personnalité (*Sixteen Personality Factors* ; 16PF). Un questionnaire plus simple d'utilisation et plus rapide, l'*Eysenck Personality Inventory* (EPI ; Eysenck, 1968), a ensuite été développé afin de ne mesurer que deux traits de personnalité considérés comme majeurs, à savoir l'extraversion (i.e., attrait pour les contacts sociaux) et le névrosisme (i.e., propension à ressentir des affects négatifs et désagréables). Cependant, ce questionnaire a

seulement été testé sur des soldats ayant des troubles psychologiques relatifs aux traumatismes de guerre et non sur une population générale. Plus tard, une version actualisée de l'EPI, l'*Eysenck Personality Questionnaire* (EPQ) a inclus une troisième dimension : le psychotisme (i.e., agressivité, manipulations). Le questionnaire actuellement le plus utilisé s'appuie sur la théorie du Big Five et a été élaboré par Costa et McCrae (1984), le *NEO-Five Factor Inventory*. Ce questionnaire est constitué de cinq dimensions : (a) l'ouverture aux expériences (i.e., curiosité intellectuelle, ouverture d'esprit, originalité) ; (b) l'agréabilité (i.e., bienveillance dans les relations interpersonnelles) ; (c) le caractère consciencieux (i.e., contrôle, minutie, discipline) ; (d) l'extraversion (i.e., énergie, enthousiasme) ; et (e) le névrosisme (i.e., émotions négatives). Par la suite, John et Srivastava (1999) ont développé le *Big Five Inventory (BFI)* qui fut traduit et validé en français par Plaisant, Courtois, Réveillère, Mendelsohn et John (2010).

L'étude de la personnalité comme facteur de santé a fait l'objet de revues (e.g., Robert & DelVecchio, 2000) et de méta-analyses détaillées (e.g., Kotor, Gamez, Schmidt, & Watson, 2010 ; Rhodes & Smith, 2006). Les traits de personnalité associés à des issues positives (i.e., ouverture aux expériences, agréabilité, et caractère consciencieux) seraient notamment considérés comme des facteurs protecteurs de santé (Gregory, Nettelbeck, & Wilson, 2010 ; Kotter-Grühn, Kleinspehn-Ammerlahn, & Gerstorf, Smith, 2009 ; Olson, 2005). Des études antérieures ont également montré que l'agréabilité et le caractère consciencieux étaient positivement corrélés avec un style de vie sain (e.g., manger des fruits et des légumes ; De Brujin, Kremers, Van Mechelen, & Brug, 2005). Le névrosisme, caractérisé par des émotions négatives, est généralement considéré comme un facteur de vulnérabilité (Bruchon-Scweitzer, 2002), et serait relié négativement aux

perceptions du vieillissement (i.e., attitude vis-à-vis de son vieillissement), et à la santé perçue (Moor et al., 2006). L'extraversion est le trait de personnalité rapportant le plus de résultats contradictoires dans la littérature. En effet, de par ses multiples facettes (i.e., positives et négatives), l'extraversion est considérée soit comme un facteur protecteur de santé (Shipley, Weiss, Der, Taylor, & Deary, 2007), soit comme un facteur de risque, conduisant à des comportements tels que le tabagisme ou l'alcoolisme (Furnham & Saipe, 1993).

Dans le domaine de l'activité physique, une méta-analyse de Rhodes et Smith (2006) a répertorié les relations entre les corrélats personnels et l'activité physique. Cette méta-analyse a indiqué que l'extraversion, le névrosisme et le caractère consciencieux corrélaient avec l'activité physique, mais que cette dernière ne corrélait pas avec l'ouverture aux expériences ni avec l'agréabilité. Toutefois, il faut noter l'existence de résultats contradictoires avec cette méta-analyse. En effet, Courneya, Nigg et Estabrooks (1998) ont montré que le caractère consciencieux et l'extraversion étaient positivement reliés à l'adoption de comportements liés à l'activité physique, alors que le névrosisme était négativement corrélé à ces comportements.

L'ouverture aux expériences est le trait de personnalité le plus documenté dans la littérature scientifique. Toutefois, les résultats relatifs à ce trait de personnalité demeurent inconsistants. Une étude de Tolea et al. (2012) a suggéré que l'ouverture aux expériences serait un corrélat important de comportements de santé (i.e., marche) chez les seniors, et aiderait à maintenir les fonctions cognitives et la santé des seniors (Olson, 2005 ; Paunonen & Ashton, 2001). De plus, Courneya, Friedenreich, Sela et Rhodes (2002) ont montré que l'ouverture aux expériences était positivement associée à l'activité physique, bien que ces résultats n'aient pas été

confirmés par la méta-analyse de Rhodes et Smith (2006). Le caractère consciencieux serait également relié négativement au niveau d'activité physique (e.g., Hampson, Goldberg, Vogt, & Dubanoski, 2007). A notre connaissance, peu d'études se sont intéressées au rôle des traits de personnalité sur les comportements liés à l'activité physique des seniors (e.g., Marks & Lutgendorf, 1999 ; Tolea et al., 2012). Tolea et al. ont montré qu'un niveau élevé de conscienciosité associé à un niveau bas de névrosisme prédisait une plus grande probabilité de s'engager dans des comportements de santé tels que l'activité physique.

Par ailleurs, peu de travaux ont examiné les traits de personnalité en relation avec les stéréotypes. On peut faire l'hypothèse que l'ouverture aux expériences pourrait protéger les seniors de l'internalisation de stéréotypes négatifs liés au vieillissement, de par la flexibilité et l'attraction pour des idées non conventionnelles auxquelles elle est associée (e.g., McCrae, 1987). L'ouverture aux expériences serait également reliée positivement à l'âge subjectif (Canada, Stephan, Caudroit, & Jaconelli, 2013 ; Stephan, Demulier, & Terracciano, 2012), à un vieillissement réussi (Costa & McCrae, 1992 ; Gregory et al., 2010; Stern, 2003, 2006), à la satisfaction de vie (Stephan, 2009), et au maintien des fonctions cognitives (Olson, 2005 ; Paunonen & Ashton, 2001).

L'ensemble de ces résultats nous amène à postuler que la personnalité pourrait prédire l'intériorisation des stéréotypes dans le Soi, affectant en retour les comportements de santé. Parmi les facteurs personnels, il semble que les théories implicites de l'habileté pourraient également être susceptibles de prédire l'internalisation des stéréotypes ; connues pour affecter le niveau de stéréotype, les théories implicites joueraient un rôle causal et prédiraient l'adhésion aux stéréotypes

(Levy, Stroessner, & Dweck, 1998).

2.3. Théories implicites de l'habileté, stéréotypes et comportements

Selon Dweck (1986), les individus se réfèreraient à deux théories distinctes dans la manière de concevoir la nature fondamentale de leurs habiletés personnelles (i.e., l'intelligence, la personnalité ou habileté sportive). En effet, un individu peut croire qu'un attribut personnel est une entité innée, non contrôlable, fixe, stable dans le temps, et que l'on peut difficilement changer (i.e., *théorie de l'entité*), ou que l'attribut est une qualité malléable, contrôlable, et qui peut s'améliorer avec le temps (i.e., *théorie incrémentielle*) (Dweck, 1986 ; Dweck & Leggett, 1988). Dweck et ses collaborateurs (Dweck & Elliot, 1983 ; Dweck, 1983 ; Dweck & Leggett, 1988) ont avancé l'idée selon laquelle les deux théories de l'intelligence auraient un lien de causalité avec des buts de nature différente (i.e., de performance *vs*. d'apprentissage). Ainsi, les théories de l'entité seraient associées à la poursuite d'un but de performance. En effet, concevoir l'intelligence comme une qualité figée, peu susceptible d'évoluer dans le temps, et non contrôlable amènerait un individu à gagner un jugement favorable sur son niveau d'intelligence en se comparant aux autres.

De plus, les individus possédant des théories de l'entité seraient plus vulnérables aux stéréotypes négatifs car ils pensent que leurs capacités intellectuelles ne sont pas modifiables (Dweck, 1999). Inversement, les théories incrémentielles seraient liées négativement aux buts d'apprentissage (Dweck, 1986 ; Da Fonseca, Cury, Bailly, & Rufo, 2004); imaginer l'intelligence comme un trait malléable et contrôlable augmenterait l'estime de soi avec la maîtrise et le progrès réalisés. Toutefois, les théories implicites ne se généralisent pas forcément à tous les attributs

humains, et sont le plus souvent spécifiques à un attribut particulier (Dweck, Chiu, & Hong, 1995). Par exemple, un individu peut croire que l'intelligence est une qualité non malléable mais que l'habileté sportive est un attribut malléable. Selon Nicholls (1989), les théories implicites définiraient les croyances des individus faisant référence à la nature des habiletés propres, plus précisément aux propriétés de ces habiletés et à leurs déterminants.

Dweck et ses collaborateurs (Dweck, 1986 ; Dweck & Leggett, 1988) ont mis en avant le fait que les théories implicites étaient reliées à des conséquences comportementales, cognitives et affectives différentes. En effet, de nombreuses études réalisées à la fois dans le domaine académique et sportif, ont rapporté que les théories de l'entité étaient associées à des comportements mal adaptatifs se traduisant par une diminution de la performance (Jourden, Bandura, & Banfield, 1991 ; Kasimatis, Miller, & Macussen, 1996 ; Ommundsen, 2001), et de la motivation intrinsèque (Biddle, Wang, Chatzisarantis, & Spray, 2003), et une augmentation de l'anxiété (Ommundsen, 2001), et de l'échec (Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006), alors que les théories incrémentielles étaient reliées à des résultats positifs comme une amélioration de la performance (Da Fonseca et al., 2008 ; Dweck, 1986 ; Dweck & Leggett, 1988), ou de la motivation intrinsèque (Cury , Elliot, Da Fonseca, & Moller, 2006 ; Wang & Biddle, 2003), une plus grande résistance à l'adversité sociale, au stress, et une moindre vulnérabilité aux maladies (Yeager, Johnson, Spitzer, Trzesniewski, & Dweck, 2014).

Dans le domaine particulier de l'activité physique, Sarrazin, Famose, Cury, Biddle, Fox et Durand (1995) ont développé le premier questionnaire mesurant les croyances relatives à la nature de l'habileté sportive (QCNHS) publié en langue

anglaise sous l'acronyme CNAAQ (*Conceptions of the Nature of Athletic Ability Questionnaire* ; Sarrazin, Biddle, Famose, Cury, Fox et Durand, 1996). Ces auteurs ont mis en évidence une perspective multidimensionnelle appréhendant la conception des individus (i.e., améliorable *vs.* stable ; apprentissage *vs.* prédisposition génétique ; habileté générale *vs.* spécifique). Ce questionnaire est composé de 21 items divisés en six sous-échelles caractéristiques de six dimensions (i.e., stable, améliorable, apprentissage, spécifique, don, générale). Les dimensions liées à l'apprentissage, spécifiques, et améliorables correspondent aux théories incrémentielles, alors que les dimensions liées à un don, générales, et stables correspondent aux théories de l'entité. Biddle et al. (2003) en ont proposé une version courte dans le domaine de l'activité physique, constituée de 12 items divisés en 4 sous-échelles (CNAAQ-2) : (a) stable (e.g., « On a un certain niveau en sport, et on ne peut vraiment pas faire grand-chose pour changer ce niveau », 3 items) ; (b) liée à un don (e.g., « Pour être bon en sport, il faut posséder à sa naissance les qualités de base qui permettent de réussir dans ce domaine », 3 items) ; (c) liée à l'apprentissage (e.g., « Il faut apprendre et beaucoup travailler pour être bon en sport », 3 items) ; et (d) améliorable (e.g., « En sport, si on travaille longtemps et souvent on progresse forcément », 3 items).

De nombreuses études se sont intéressées aux réactions cognitives et affectives associées aux théories implicites de l'habileté physique. Ces études ont révélé que les théories incrémentielles étaient reliées positivement à la satisfaction (Ommundsen, 2001), au plaisir (Biddle et al., 2003), à des affects positifs (Jourden et al., 1991), et à des chances de réussite élevées (Jourden et al., 1991 ; Kasimatis et al., 1996). Par opposition, les théories de l'entité semblent entraîner une moindre satisfaction et une plus grande anxiété (Ommundsen, 2001), davantage d'affects négatifs en cas de

difficultés (Kasimatis et al., 1996), et une diminution de la confiance en soi (Jourden et al., 1991). Plus globalement, les théories incrémentielles relatives aux habiletés sportives seraient davantage associées à des patrons adaptatifs que les théories de l'entité (Ommundsen, 2003 ; Sarrazin et al., 1996).

Quelques études se sont intéressées à la relation entre les stéréotypes et les théories implicites de l'habileté dans le domaine académique (e.g., Bagès & Martinot, 2011 ; Burnette, Pollack, & Hoyt, 2010 ; Levy et al., 1998). Par exemple, l'étude de Burnette et al. (2010) a montré que des jeunes femmes qui pensent que la capacité d'être un leader est fixe, qui ont adopté des théories de l'entité, et qui ont un faible sentiment d'auto-efficacité ont rapporté des scores d'auto-évaluation inférieurs en contexte de menace du stéréotype lié au genre, comparativement au groupe contrôle. Ces études suggèrent donc que les théories implicites de l'habileté et l'activation de stéréotypes interagiraient pour déterminer le comportement.

2.4. Synthèse

Les antécédents de l'adhésion des stéréotypes présentés dans ce chapitre ont une influence, négative ou positive, sur les comportements de santé des seniors. Nous émettons l'hypothèse que ces variables seraient des antécédents de l'intériorisation des stéréotypes, en agissant comme des facteurs protecteurs ou au contraire néfastes. Bien que de nombreux travaux aient été conduits dans le domaine cognitif, peu d'études à ce jour ont examiné le rôle des stéréotypes dans le domaine spécifique de l'activité physique chez les seniors. De plus, si quelques études ont rapporté que les théories implicites de l'habileté et les stéréotypes étaient reliés dans le domaine académique, aucune recherche n'a étendu ces résultats au domaine spécifique de l'activité physique chez les seniors.

CHAPITRE 3

Malléabilité des stéréotypes

Les stéréotypes liés au vieillissement sont très répandus et sont connus pour être stables, résistants et difficile à changer (Cuddy et al., 2005). Toutefois, Blair (2002) a identifié différentes stratégies pouvant limiter l'activation des stéréotypes. L'objectif de ce dernier chapitre est de présenter les différentes stratégies qui permettent d'agir sur les stéréotypes et d'envisager comment elles pourraient être utilisées dans le domaine de l'activité physique des seniors. La première partie de ce chapitre sera consacrée aux stratégies permettant de limiter l'activation des stéréotypes dans le cadre du jugement d'autrui. Dans une seconde partie, nous présenterons les effets d'interventions basées sur de l'activité physique sur les attitudes et les perceptions liées au vieillissement ; ceci nous conduit à nous interroger sur la conception d'interventions permettant de réduire l'activation de stéréotypes liés au vieillissement dans le domaine de l'activité physique des seniors.

3.1. La suppression des stéréotypes négatifs

Les études basées sur la suppression des stéréotypes (i.e., l'inhibition active des pensées stéréotypiques) font l'objet de résultats contradictoires. En effet, la suppression de stéréotypes peut soit réduire l'influence des stéréotypes sur le jugement (Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000), soit l'amplifier (Galinsky & Moskowitz, 2000 ; Macrae, Bodenhausen, Milne, & Jetten, 1994). Macrae et al. ont notamment indiqué que les individus pouvaient supprimer des stéréotypes, en modifiant leurs pensées. Dans le cadre d'une suppression de stéréotypes, deux éléments demeurent primordiaux, à savoir la motivation et la capacité cognitive des individus (Wegner et al., 1992).

La suppression des stéréotypes peut être spontanée et réfléchie (Wyer, Sherman, & Stroessner, 1998), mais aussi découler d'une focalisation sur soi-même (Macrae et al., 1994). Les individus qui tentent de supprimer activement les stéréotypes pourraient faire l'expérience d'un rebond, qui va être déterminé par la motivation, les capacités cognitives, ou les préjugés de l'individu (Wyer, Sherman, & Stroessner, 2000). En effet, lorsqu'un individu présente un manque de motivation, et des préjugés, il serait alors plus vulnérable aux rebonds (Monteith, Spicer, & Tooman, 1998). Selon Gollwitzer et Schaal (1998), une suppression efficace des stéréotypes devrait être accompagnée d'une intention spécifique mise en œuvre au préalable (i.e., motivation à juger autrui d'une manière équitable et impartiale ; ne pas prêter attention au stéréotype lié au genre), et doit reposer sur une pratique intensive des participants. De plus, il serait possible de réduire le poids des stéréotypes négatifs en proposant un amorçage positif du senior avant la tâche (Stein, Blanchard-Fields, & Hertzog, 2002), ou des contacts positifs avec des personnes jeunes (Abrams, Eller, & Bryant, 2006).

3.2. L'activation de contre-stéréotypes

L'activation de contre-stéréotypes (i.e., messages ou images qui sont inverses aux représentations stéréotypées habituellement véhiculées) est une stratégie qui vise à réduire l'influence automatique des stéréotypes. Selon Blair et Banaji (1996), les individus seraient en mesure de limiter cette influence par l'activation intentionnelle de contre-stéréotypes. Dans le même ordre d'idées, il semble que les contre-stéréotypes peuvent également limiter l'influence des stéréotypes sur le comportement. Par exemple, une étude de Levy (1996) a indiqué que les performances des individus dans une tâche de mémorisation diminuaient suite à l'activation d'un stéréotype implicite associé aux seniors, particulièrement lorsque celui-ci était associé à des aspects négatifs de la vieillesse (i.e., lenteur, perte de mémoire). Cependant, lorsque ce stéréotype était associé à des aspects positifs (i.e., sagesse, expérience), les performances des individus amorcés avec ce stéréotype étaient supérieures à celles des individus de la condition contrôle. Ces résultats illustrent l'idée que les stimuli présents dans notre environnement pourraient, sans que nous en ayons conscience, avoir une influence sur la façon dont nous nous comportons. Une étude menée par Bargh, Chen et Burrows (1996) a montré que le fait d'avoir à l'esprit le stéréotype associé aux seniors, a conduit des participants (i.e., jeunes adultes) à marcher plus lentement en sortant du laboratoire. Ces auteurs ont également révélé que ces effets n'étaient pas conscients et ont ainsi évoqué le concept de comportement social automatique (i.e., *automatic social behavior* ; Bargh et al., 1996).

Des recherches ont également indiqué que l'imagerie mentale (i.e., acte conscient et intentionnel de la création d'une représentation mentale d'une personne, d'un objet, ou d'un évènement) augmenterait l'efficacité des contre-

stéréotypes en diminuant l'occurrence de stéréotypes automatiques dans les pensées des individus (Blair, Ma, & Lenton, 2001). Par exemple, Blair et al. (2001) ont demandé à des participants d'imaginer soit une femme forte (i.e., pourquoi elle est considérée comme forte, ce qu'elle est capable de faire), soit des vacances aux Caraïbes (i.e., le lieu, ce qu'ils y feraient). Les résultats ont montré que les participants qui ont été invités à visualiser durant cinq minutes une femme forte, ont obtenu des scores plus faibles de stéréotypes implicites liés au genre, comparativement au groupe contrôle. Plus largement, il a été rapporté que l'imagerie mentale était efficace pour modifier le jugement et les comportements, notamment dans les domaines de l'apprentissage et de la mémoire d'un athlète, et de la performance intellectuelle (Pham & Taylor, 1999). De plus, elle aurait également le potentiel d'influencer les processus implicites, tels que les stéréotypes implicites, de par sa ressemblance avec une expérience réelle, en augmentant l'accessibilité des contre-stéréotypes (Bargh, 1996).

3.3. La focalisation de l'attention

De nombreuses études ont montré que l'influence des stéréotypes sur le jugement est plus probable lorsque les individus ne font pas attention à la cible qu'ils doivent juger (Fiske, 1998). Cette stratégie repose sur le fait que les stéréotypes sont activés indépendamment de l'état attentionnel de l'observateur (i.e., automatiquement). En revanche, les processus requis pour contrer un stéréotype ne seraient rendus possibles qu'avec une attention suffisante. Ainsi, le manque d'attention pourrait augmenter la probabilité que le jugement et le comportement soient biaisés par les stéréotypes automatiques (Fiske, 1998 ; Fiske & Neuberg, 1990).

La focalisation de l'attention est considérée comme un facteur essentiel pour prédire l'impact des stéréotypes sur les comportements, car elle permettrait de modérer l'influence des stéréotypes sur le jugement (Blair, 2002 ; Macrae, Bodenhausen, Miln, Thorn, & Castelli, 1997). Le fait de focaliser son attention sur autre chose que les stéréotypes empêcherait notamment l'activation automatique des stéréotypes. Par exemple, dans une étude de Spencer, Fein, Wolfe, Fong et Dunn (1998), les individus étaient invités à réaliser une tâche de complétion de mots mesurant l'activation de stéréotypes. La moitié d'entre eux devaient en même temps effectuer une tâche distractive visant à ajouter une charge cognitive. Les résultats ont montré que les stéréotypes étaient moins activés dans cette condition de double tâche que dans la condition contrôle.

3.4. La manipulation des indices contextuels

La manipulation des indices contextuels semble également modérer l'activation des stéréotypes automatiques (Wittenbrink, Judd, & Park, 2001b). Macrae, Bodenhausen et Milne (1995) ont montré qu'un léger changement dans le contexte pouvait avoir un effet important sur l'activation des stéréotypes. Plusieurs études de Wittenberg et al. (2001b) ont observé que les différents contextes sociaux (i.e., nationalité, genre) ou géographiques (i.e., lieu religieux, rue) pouvaient modérer les évaluations automatiques d'un groupe d'individus. Ces études suggèrent globalement que la perception automatique dépendrait de l'intégration des composantes des stimuli contextuels, et que de petits changements dans ces derniers pouvaient produire des résultats radicalement différents (Blair, 2002).

3.5. Rôle de l'activité physique sur les attitudes ou les stéréotypes liés au vieillissement

Les sections précédentes ont permis d'identifier les stratégies limitant l'activation des stéréotypes principalement dans le cadre du jugement d'autrui. La question de la pertinence de ces stratégies pour limiter l'adhésion aux stéréotypes dans le cadre du comportement, et plus particulièrement de l'activité physique est posée. Dans la littérature existante cette question reste inexplorée.

Toutefois quelques travaux antérieurs suggèrent que des interventions adaptées pourraient permettre de réduire l'influence des stéréotypes négatifs sur le comportement, en jouant sur les stéréotypes personnels des individus. Une étude de Rowland, Dickinson, Newman, Ford et Ebrahim (1994) a ainsi observé des effets favorables d'un programme combinant activité physique et apport de connaissances (i.e., sur les facteurs de risques cardiovasculaires, les modalités d'une pratique physique régulière et adaptée, et la gestion du stress), sur la santé perçue, les connaissances et l'attitude à l'égard de l'exercice physique. Klusmann, Evers, Schwarzer et Heuser (2012) ont révélé de leur côté, que l'engagement dans un programme d'activité physique adaptée (i.e., trois séances de 90 min par semaine pendant six mois) influençait positivement les perceptions du vieillissement (i.e., l'attitude vis-à-vis de son vieillissement) de femmes sédentaires de plus 70 ans, par le biais de la motivation d'approche (i.e., attentes de bénéfices immédiats liés à la pratique). Ces études suggèrent donc qu'un programme d'activité physique adaptée pourrait limiter l'adhésion des seniors aux stéréotypes négatifs qui pèsent sur eux.

3.6. Synthèse

Plusieurs stratégies visant à modifier les stéréotypes sont rapportées dans la littérature en psychologie sociale, telle la suppression des stéréotypes négatifs, l'activation de contre-stéréotypes, la focalisation de l'attention, et la manipulation des indices contextuels et motivationnels (Blair, 2002). Par ailleurs, certaines de ces stratégies, couplées à un programme d'activité physique adaptée aux seniors, seraient susceptibles de modifier les perceptions et attitudes liées au vieillissement, et possiblement les stéréotypes liés à l'activité physique.

Problématique et Programme de Recherche

Bien que l'activité physique semble être bénéfique pour la santé des seniors (e.g., Chodzko-Zajko et al., 2009 ; Chou et al., 2012), cette population n'est pas suffisamment active au regard des recommandations actuelles de l'OMS (Hallal et al., 2012). Nous adoptons une approche psychologique de cette inactivité physique, en postulant que celle-ci serait en partie due à des « barrières » psychologiques. Les études existantes se sont principalement basées sur des modèles sociocognitifs tels que la théorie socio-cognitive de Bandura (1986) ou le modèle HAPA (Schwarzer, 1992). Ces travaux ont permis d'identifier le rôle de différents antécédents psychologiques de l'engagement dans une activité physique chez les seniors (e.g., Rhodes & Smith, 2006) et plus particulièrement le rôle de l'auto-efficacité (e.g., McAuley et al., 1999 ; White et al., 2011).

Parallèlement, la population des seniors est sujette à de nombreux stéréotypes (e.g., les seniors ont une santé fragile ; Hétu, 1988 ; les seniors sont perçus comme étant peu compétents ; Cuddy & Fiske, 2002). Les femmes seniors seraient une population doublement stigmatisée car elles souffriraient de stéréotypes négatifs liés à la fois au genre (e.g., Pinquart & Sörensen, 2001) et au vieillissement (e.g., Cuddy et al., 2005). Nous pensons que ces stéréotypes pourraient constituer un frein à une pratique physique régulière des seniors, comme le suggèrent certaines raisons évoquées par ces derniers pour justifier leur manque d'engagement (e.g., « j'ai l'impression de ne pas être le sportif-type ») (Booth et al., 1997 ; Booth et al., 2002 ; Trost, Owen, Bauman, Sallis, & Brown, 2002). Ce frein agirait par l'intermédiaire de l'internalisation des stéréotypes dans les perceptions de soi de l'individu (Levy, 2009), qui influenceraient à leur tour l'adoption de comportements de santé chez les seniors (e.g., Sargent-Cox et al., 2012). On peut ainsi faire l'hypothèse que de tels mécanismes puissent s'observer dans le contexte particulier de l'activité physique.

Ce travail doctoral défend la thèse selon laquelle il existerait des stéréotypes liés au vieillissement dans le domaine de l'activité physique chez les seniors, et que leur internalisation permettrait d'expliquer l'engagement des seniors dans l'activité physique. La défense de cette thèse est sous-tendue par le questionnement multiple suivant : (a) quels sont les stéréotypes liés au vieillissement dans le domaine de l'activité physique ? ; (b) quels sont les antécédents personnels de l'internalisation des stéréotypes liés au vieillissement et leurs conséquences sur les comportements de santé ? ; (c) comment modifier l'influence des stéréotypes liés au vieillissement sur l'activité physique des seniors ?

1. Quels sont les stéréotypes liés au vieillissement dans le domaine de l'activité physique ?

Depuis plusieurs décennies, la population des seniors est associée à un certain nombre de stéréotypes, notamment ceux liés au vieillissement (Brewer & Lui, 1984 ; Schmidt & Boland, 1986), et au déclin de leurs capacités fonctionnelles et cognitives (e.g., Cuddy & Fiske, 2002). Bien que les stéréotypes soient définis de différentes manières, un consensus existe concernant leur influence positive ou négative sur les comportements de santé des individus (e.g., Levy & Myers, 2004 ; Levy et al., 2002). Selon Levy (2009), l'internalisation des stéréotypes se déroulerait tout au long de la vie et aurait des conséquences sur le vieillissement.

Toutefois, dans le domaine spécifique de l'activité physique, le contenu des stéréotypes liés au vieillissement n'est pas clairement identifié et la manière dont ces stéréotypes pourraient influencer l'engagement des seniors dans l'activité physique est méconnue à ce jour. Ces stéréotypes pouvant constituer des barrières psychologiques à l'engagement des seniors dans une activité physique, il importe d'élaborer un outil psychométrique valide permettant de les mesurer. La première étude de cette thèse fait partie d'un travail d'élaboration et de validation d'un questionnaire psychométrique mesurant les stéréotypes liés au vieillissement dans le domaine de l'activité physique, auquel nous avons contribué. Dans la continuité de ce travail, nous avons souhaité mieux comprendre les antécédents et conséquences de l'internalisation des stéréotypes liés au vieillissement dans le domaine de l'activité physique.

2. Quels sont les antécédents personnels de l'internalisation des stéréotypes liés au vieillissement et leurs conséquences sur les comportements de santé ?

De nombreuses études ont indiqué que l'internalisation des stéréotypes serait influencée par un certain nombre d'antécédents personnels, tels que l'adhésion aux stéréotypes liés au vieillissement, les perceptions de soi, les traits de personnalité, et les théories implicites de l'habileté, qui a leur tour influenceraient négativement ou positivement les comportements de santé des seniors (e.g., Gregory et al., 2010 ; Levy, 2009). La plupart de ces études concernent le fonctionnement cognitif des seniors, en particulier la mémoire (e.g., Chasteen, Kang, & Remeidos, 2012 ; Chasteen et al., 2005), le domaine spécifique de l'activité physique restant inexploré. L'objectif de la deuxième étude de cette thèse a donc été de mieux comprendre les antécédents personnels (i.e., traits de personnalité et théories implicites de l'habileté) de l'internalisation des stéréotypes et leur relation avec des variables liées à l'activité physique.

Il est bien établi dans la littérature que les stéréotypes liés au vieillissement ont des conséquences importantes en termes de performance ou de santé. L'adhésion à ces stéréotypes serait notamment liée à l'adoption de comportements de santé (Levy & Myers, 2004) et à la longévité (Levy et al., 2002). Plusieurs études de Levy et al. ont montré que les seniors possédant une perception positive de leur vieillissement et des stéréotypes positifs seraient en meilleure santé et vivraient plus longtemps (Levy et al., 2002a ; Levy et al., 2002b), récupèreraient plus rapidement d'un évènement cardiovasculaire (Levy et al., 2006) ou d'un handicap (Levy et al., 2012), et auraient une meilleure mémoire (Levy et al., 2012) et une meilleure audition (Levy et al., 2006), que les seniors qui présentent une perception négative de leur vieillissement

ou des stéréotypes négatifs. Toutefois, aucune étude longitudinale n'a encore examiné les effets des stéréotypes sur les comportements des seniors à l'égard de l'activité physique. Ainsi, l'objet de notre troisième étude a consisté à tester l'effet de l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique sur la vitalité perçue et la pratique régulière d'une activité physique.

3. Comment modifier les stéréotypes liés au vieillissement dans le domaine de l'activité physique ?

Plusieurs stratégies visant à modifier les stéréotypes sont recensées dans la littérature (Blair, 2002 ; Fiske, 1998), comme la suppression des stéréotypes, lorsque celle-ci est accompagnée d'une intention spécifique (i.e., motivation) (Gollwitzer & Schaal, 1998), ou l'activation de contre-stéréotypes (Blair & Banaji, 1996). En outre, la focalisation de l'attention empêcherait l'activation des stéréotypes automatiques (Macrae et al., 1997). D'autres stratégies comme la manipulation des indices contextuels (Wittenbrink et al., 2001b), la motivation, les ressources pour réussir, la prise de conscience (Bargh, 1992, 1999), le sentiment d'appartenance, la compréhension, le contrôle et la confiance en soi modifieraient également les stéréotypes (Fiske, 1998). L'objectif de notre quatrième étude a été d'identifier dans quels contextes (i.e., stéréotypique *vs.* contre-stéréotypique) les théories implicites de l'habileté sont le plus efficaces sur une tâche de force musculaire chez des seniors actifs. Enfin, l'objectif de la dernière étude a été d'examiner les effets d'une intervention combinant activité physique, soutien social et informations contre-stéréotypiques sur l'activité physique, les stéréotypes liés au vieillissement dans le domaine de l'activité physique, la qualité de vie, et la condition physique de femmes seniors sédentaires.

2ème Partie : Etudes Empiriques

ETUDE 1

Development and Validation of the Aging Stereotypes and Exercise Scale[1]

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[1] Cet article a fait l'objet d'une publication :
Chalabaev, A., **Emile, M.,** Corrion, K., Stephan, Y., Clément-Guillotin, C., Pradier, C., & d'Arripe-Longueville, F. (2013). Development and validation of the aging stereotypes and exercise scale. *Journal of Aging and Physical Activity*, *21*, 319-334.

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Development and Validation of the Aging Stereotypes and Exercise Scale

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This article presents the development and validation of the Aging Stereotypes and Exercise Scale (ASES), which measures different dimensions of aging stereotypes in the exercise domain. Drawing on past research on older adults' perceived barriers to exercise, these dimensions include stereotypes about positive and negative exercise outcomes for older adults and about older adults' psychological barriers to exercise (i.e., lack of self-efficacy and motivation). Four studies involving 714 participants examined the factorial structure and invariance, temporal stability, and external validity of the scale. The results supported a 3-factor model that was invariant across age. Age differences in stereotype content appeared, with older adults holding more positive stereotypes than younger adults. Also as predicted, the more older adults endorsed negative stereotypes, the lower their physical self-worth, self-rated health, and subjective age. Last, responses to the ASES appeared to be stable over a 6-wk period.

Keywords: elderly, barriers, outcomes

Adequate levels of daily physical activity may be beneficial for older adults' health (e.g., Hogan, 2005). Indeed, regular exercise has been shown to increase muscle strength and mobility (e.g., Fiatarone et al., 1994), slow the progression of functional decline (e.g., Gill et al., 2002), and promote quality of life and successful aging (e.g., Baker, Meisner, Logan, Kungl, & Weir, 2009). Despite these benefits, fewer than 40% of the individuals age 65 years or more are sufficiently active worldwide (World Health Organization, 2001). Why are older adults reluctant to exercise? We argue that negative exercise-related aging stereotypes may contribute to the low rate of participation observed among older adults, and the goal of the current study was to develop a scale measuring such stereotypes.

The assumption that negative stereotypes influence exercise participation is based on the stereotype-embodiment theory (Levy, 2009). According to this model, people assimilate aging stereotypes during the socialization process, notably the belief that aging is associated with an inevitable functional decline (e.g., Löckenhoff

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et al., 2009). In other words, people learn stereotypes from the surrounding culture without questioning their veridicality, since it is not necessary to do so as a younger person. These beliefs have important consequences when entering old age. Indeed, negative aging stereotypes held earlier in life may predict worse health in older individuals (Levy, Zonderman, Slade, & Ferrucci, 2009). This influence is assumed to occur because as individuals age, they direct aging stereotypes at themselves, which gives rise to negative self-perceptions of aging. In turn, these self-perceptions may have long-term effects on the adoption of health-related behaviors (e.g., Levy & Myers, 2004; Wurm, Tomasik, & Tesch-Römer, 2010), functional health, and survival (e.g., Levy, Slade, & Kasl, 2002; Levy, Slade, Kunkel, & Kasl, 2002; Wurm, Tesch-Römer, & Tomasik, 2007). For example, Wurm et al. (2010) longitudinally demonstrated that positive views on aging promote physical activity (e.g., walking) among middle-aged and older adults. More particularly, they showed that older adults with worse health walked as much as those with good health, provided they had a positive view on aging, in other words, that they viewed aging as a time of personal growth and development.

Self-perceptions of aging are close to the concept of stereotype; however, these two constructs should not be confounded, as aging stereotypes refer to beliefs about older adults in general. Although the relationships between self-perceptions of aging and exercise participation have been documented, little is known about how endorsement of aging stereotypes affects exercise participation. Only one study to our knowledge has examined this question (Sanchez Palacios, Trianes Torres, & Blanca Mena, 2009). The results confirmed that the more older adults endorse negative stereotypes, the less they report exercising. However, the stereotypes examined in that study were not specific to exercise but were instead related to health, social activity, and personality. We argue that aging stereotypes in the exercise domain may be an important factor of exercise-related behaviors. Although this question has not been investigated, past research on perceived barriers to exercise provides support for this assumption. For example, older adults often report barriers such as "I am not the sporty type" or "I am too old to exercise" (e.g., Booth, Bauman, & Owen, 2002; Netz, Zeev, Arnon, & Tenenbaum, 2008) as reasons for not exercising. In line with the stereotype-embodiment theory (Levy, 2009), these negative self-perceptions could reflect the internalization of stereotypes of older adults as not capable of exercising. Given the importance of such beliefs in predicting exercise participation, more research is needed to better understand them.

What is the content of exercise-related aging stereotypes? Several measures of aging stereotypes exist (e.g., Kruse & Schmitt, 2006; Palmore, 1990), but no scale to our knowledge specifically focuses on exercise-related stereotypes. Existing aging-stereotype scales may sometimes include a measure of older adults' physical abilities (e.g., "Physical strength tends to decline in old age," Palmore, 1990). However, we hypothesize that these beliefs are not the whole picture of exercise-related stereotypes. Indeed, exercise-related aging stereotypes may include other components such as beliefs about older adults' self-efficacy (i.e., Are they confident in their ability to exercise?), motivation for exercising (i.e., Do they want to exercise regularly?), and so on. It therefore seems necessary to develop an instrument that assesses the various dimensions of aging stereotypes in the exercise domain to have a more precise picture of their content and to deepen our understanding of their role in exercise-related behaviors. The goal of the current research was to

develop a scale measuring these stereotypes: the Aging Stereotypes and Exercise Scale (ASES).

Development and Validation of the ASES

Given the assumption that older adults' perceived barriers to exercise partly reflect internalization of aging stereotypes, we considered that the content of these stereotypes would closely reflect such barriers. Therefore, the development of the ASES was based on the literature on subjective barriers to exercise among older adults (e.g., Booth et al., 2002; Cohen-Mansfield, Marx, & Guralnik, 2003; Netz et al., 2008; O'Brien Cousins, 2003; Vlachopoulos, Letsiou, Palaiologou, Leptokaridou, & Gigoudi, 2010). These studies have usually been based on self-efficacy theory (Bandura, 1997), which holds that behavior is influenced by two main factors: the expectation that a particular behavior will lead to certain outcomes (i.e., outcome expectation) and the conviction that one can successfully execute the behavior (i.e., self-efficacy expectation). In other words, older adults are reluctant to exercise when they perceive no benefits associated with this activity or when they believe they are not capable of exercising. The objective was thus to investigate whether there are shared beliefs in the general population (i.e., stereotypes) that reflect these two types of barriers. More particularly, the ASES measures stereotypes about exercise outcomes for older adults and their ability to exercise on a regular basis.

First, the development of items to measure exercise outcomes was inspired by existing scales such as the Older Persons' Attitudes Toward Physical Activity and Exercise Questionnaire (OPATPAEQ; Terry, Biddle, Chatzisarantis, & Bell, 1997) and the Outcome Expectations for Exercise Scale-2 (OEES-2; Resnick, 2005). As in the latter scale, the ASES measures perceived positive outcomes (e.g., Does exercise enhance physical fitness? mood?) and perceived negative outcomes (e.g., Does exercise cause pain?) of exercise. However, the ASES differs from these scales in important regards: Whereas the OPATPAEQ and the OEES-2 assess older adults' personal beliefs about exercise outcomes, the ASES measures people's stereotypes about exercise outcomes in older adults. Second, the development of items to assess older adults' abilities focused on two types of abilities: physical and psychological. More precisely, we initially wanted to assess whether people think that older adults have the physical abilities required to exercise regularly (i.e., physical ability stereotype), feel confident in their ability to support the demands associated with exercise (i.e., self-efficacy stereotype), and are motivated to exercise on a regular basis (i.e., motivation stereotype). Elaboration of these items was inspired by the Amotivation Toward Exercise Scale (ATES; Vlachopoulos & Gigoudi, 2008; Vlachopoulos et al., 2010), which measures the reasons that give rise to exercise amotivation within the framework of self-determination theory (Ryan & Deci, 2002). Again, the ASES differs from this scale as it assesses people's stereotypes about older adults' abilities to exercise, whereas the ATES measures older adults' exercise-related personal beliefs.

Last, to measure stereotypes, respondents were asked to report their beliefs about exercise outcomes and older adults' abilities to exercise in general. Although past studies have shown that the superordinate category "older adults" includes several subcategories such as severely impaired, recluse, or perfect grandparent (e.g.,

Hummert, 1990), measuring generalized beliefs about older adults is relevant as they may affect behavior (e.g., Harwood & Williams, 1998; Kruse & Schmitt, 2006).

Four studies involving 714 participants were conducted to validate the ASES. They examined the factorial structure and invariance, temporal stability, and external validity of the scale. Ethical approval was obtained for these studies along with participants' informed written consents. These studies are described in detail herein.

Study 1: Development of a Preliminary Version of the ASES

Pilot Study

A preliminary version of the ASES was first developed and included five presumed components of exercise-related aging stereotypes: positive outcomes, negative outcomes, older adults' physical ability, self-efficacy, and motivation. Items were adapted from the OPATPAEQ, OEES-2, and ATES. Those scales do not assess aging stereotypes but instead older adults' personal beliefs about exercise. Therefore, items were adapted so that they measure stereotypes. For example, the ATES item "I do not exercise because I do not wish to coordinate my life to regularly attend an exercise program" was substituted in the ASES with "In general, I believe that older adults are willing to organize their lives so they can regularly exercise." Six items were elaborated for each component, resulting in a pool of 30 items. Ten students (M_{age} = 22.50 years, SD = 1.08) and 10 retired individuals (M_{age} = 67.45 years, SD = 5.42) assessed the clarity of each item on a 7-point scale from 1 (*not clear at all*) to 7 (*completely clear*). When an item was attributed a score lower than 5, participants were invited to explain why they attributed this score. After this evaluation, three items were modified and the clarity of the new version was again evaluated by 10 students and 10 retired individuals. The results showed that all of the items were evaluated as clear ($M \geq 5.00$, $SD < 1.50$). The factor structure of the preliminary version was next examined in Study 1.

Method

The participants were 301 individuals (117 men and 184 women) ranging in age from 23 to 76 years (M = 42.67, SD = 12.06), 221 of whom (73.4%) reported exercising at least once a week. They were recruited through an announcement sent to faculty and staff on the mailing list of the Nice Sophia Antipolis University, and all responded to the questionnaire online. The participants were teachers and researchers (40.2%), administrative staff and technicians (36.5%), or students (23.3%). They were instructed to indicate their beliefs about older adults and exercise in general (e.g., walking, running, swimming). All items were preceded by the stem "I believe that, in general. . . ." Responses were provided on a 7-point Likert scale ranging from 1 (*do not agree at all*) to 7 (*totally agree*).

Results and Discussion

Principal-axis factor analyses (PFA) were performed to examine the factorial structure of the preliminary version of the ASES (oblimin-type rotation). These

analyses allow the identification of latent variables as the underlying causes of the measured variables in the context of scale development (Floyd & Widaman, 1995). Before running principal-axis factor analyses, a parallel analysis (Horn, 1965) was performed to determine the number of appropriate factors that could be extracted without constraining the model. In the random distribution, values lower than the factor weights were shown only for the first three factors: Factor 1 (random value) = 1.63, PFA value = 7.03; Factor 2 (random value) = 1.55, PFA value = 3.79; Factor 3 (random value) = 1.48, PFA value = 2.17. Based on this result, we next performed principal-axis factor analyses by constraining the number of factors to three.

The four best items per factor were selected to develop a short scale that was easy to use with older individuals. This selection was based on factor loadings: Items were not retained when they showed loadings below .60 or when they loaded above this value on two factors simultaneously (Guadagnoli & Velicer, 1988). Based on these selection criteria, 12 items were retained with factor loadings >.71 on the expected factor and <.16 on the other factors (see Table 1). While both positive and negative items were generated for each factor in the initial pool, only items that were in the same direction showed appropriate loadings.

A three-factor structure emerged from the principal-axis factor analysis, whereas we initially hypothesized a five-factor scale (i.e., positive outcomes, negative outcomes, sufficient physical abilities, self-efficacy, and motivation). More specifically, the results revealed that the self-efficacy and motivation items loaded on the same factor, which was called psychological barriers. This finding seems to contradict the ATES, in which self-efficacy and motivation appeared as separate factors (Vlachopoulos & Gigoudi, 2008).This may be explained by the fact that the ASES measures generalized beliefs about older individuals while the ATES assesses specific beliefs about oneself. In other words, one may hold similar beliefs about older adults' self-efficacy and effort while having differentiated beliefs about one's own self-efficacy and effort. The principal-axis factor analysis also showed that items measuring negative outcomes and sufficient physical abilities loaded on the same factor. This suggests that believing that exercise may be dangerous is similar to believing that older adults' physical abilities are not sufficient to meet the demands of exercise. This factor was called risks of exercise. The third factor regrouped items measuring the positive psychological and physical outcomes associated with exercise and was called benefits of exercise.

At least 50% of the total variance should be explained by the extracted factors (Streiner, 1994), and this was the case in this study. Factor 1 (benefits of exercise) explained 34.16% of the variance, Factor 2 (risks of exercise) explained 21.17% of the variance, and Factor 3 (psychological barriers) explained 13.10% of the variance.

Study 2: Factorial Structure of the ASES

The goal of Study 2 was to confirm the factorial structure of the 12-item scale developed in Study 1 through confirmatory factor analyses (CFA). To ascertain the generalizability of the instrument, a different sample was surveyed in Study 2. This sample was broader in age, exercise participation, and education than the sample in Study 1. Study 2 also tested the invariance of the factorial structure across age, along with the internal consistency of each subscale. Finally, Study 2 examined the degree of agreement between participants on each subscale to determine whether there

Table 1 Descriptive Statistics and Factor Loadings of the Three-Factor Oblimin Solution of the Aging Stereotypes and Exercise Scale (ASES) in Study 1

ASES item numbers and item wording	*M*	*SD*	Benefits	Risks	Psychological barriers
Benefits Stereotype					
2. *L'activité physique permet d'améliorer le moral des seniors* (Exercise raises older adults' spirits).	6.43	0.78	–.87	.14	–.03
5. *L'activité physique améliore la forme physique des seniors* (Exercise enhances older adults' physical fitness).	6.34	0.97	–.73	–.13	.01
8. *L'activité physique améliore le sentiment de bien-être des seniors* (Exercise enhances older adults' psychological well-being).	6.34	0.90	–.82	–.06	.02
11. *L'activité physique permet aux seniors de se sentir bien physiquement* (Exercise makes older adults feel good physically).	6.28	0.93	–.86	–.03	–.04
Risks Stereotype					
3. *Les seniors ont des capacités physiques trop limitées pour pratiquer une activité physique* (The physical capacities of older adults are too diminished for exercise).	2.10	1.22	–.07	.82	.14
9. *Les seniors n'ont pas assez de résistance physique pour pratiquer une activité physique* (Older adults do not have sufficient strength to exercise).	2.19	1.31	.02	.80	.15
12. *L'activité physique est dangereuse pour les seniors car elle entraîne trop d'essoufflement* (Exercise is dangerous because it causes older adults to become too short of breath).	2.31	1.35	–.01	.78	–.14
6. *L'activité physique doit être évitée par les seniors car elle provoque des blessures* (Exercise should be avoided by older adults because it provokes injuries).	2.12	1.15	.16	.72	–.10
Psychological-Barriers Stereotype					
1. *Les seniors sont convaincus qu'ils sont capables de faire de l'activité physique* (Older adults are convinced that they are capable of exercising).	4.22	1.53	–.05	–.01	.86
7. *Les seniors se sentent capables de pratiquer une activité physique* (Older adults feel capable of exercising).	3.77	1.38	.01	.04	.84
10. *Les seniors ont suffisamment de volonté pour pratiquer une activité physique régulièrement* (Older adults have enough will to exercise regularly)	3.64	1.47	.05	–.03	.84
4. *Les seniors ont envie de consacrer une partie de leur temps à la pratique d'une activité physique régulière* (Older adults are willing to organize their lives so they can regularly exercise).	3.77	1.33	.04	.03	.81

are shared beliefs (i.e., stereotypes) about older individuals in the exercise domain. The content of these stereotypes (i.e., positive vs. negative) was also examined.

Method

Forty-seven men and 120 women ranging in age from 14 to 89 years ($M = 47.9$, $SD = 25.3$) took part in this study. One hundred eight (64%) reported exercising at least once a week. Participants were recruited at different places in the region of Nice, such as Nice Sophia Antipolis University, high schools, nursing homes, continuing education classes for older adults, and sports clubs. They were high school or college students (35.4%), workers (33.7%), and retired (30.9%). Sixty percent of the working and retired persons were employees, 35% were middle or senior managers, and 5% were merchants.

Results and Discussion

Confirmation of the Three-Factor Structure. CFA was performed with EQS software (Bentler, 1995) to test how the 12-item, three-factor model fit the data. Bootstrap resampling was used since the data presented significant multivariate nonnormality (normalized kurtosis: 28.49). The CFA showed that the 12-item model did not correctly adjust to the data, $\chi^2(51) = 111.74$, $p < .001$; nonnormed fit index (NNFI) = .88; comparative fit index (CFI) = .91; root-mean-square error of approximation (RMSEA) = .09; confidence interval (CI) RMSEA = .06/.11. The model was thus respecified based on the Lagrange multiplier test for adding parameters. Specifically, one covariance was added between the errors of two items measuring risks of exercise. The respecified model presented good fit to the data, $\chi^2(50) = 59.97$, $p > .15$; NNFI = .98; CFI = .98; RMSEA = .04; CI RMSEA = .00/.06 (see Figure 1).

Internal Consistency and Correlations Between Subscales. Each of the three subscales presented satisfactory internal consistency (psychological barriers, $\alpha = .84$; benefits of exercise, $\alpha = .87$; risks of exercise, $\alpha = .84$). The intersubscale correlation coefficients were .27 (risks-psychological barriers), –.61 (benefits-psychological barriers), and –.29 (benefits-risks).

Invariance. The invariance of the factorial structure across age was examined using multigroup CFA. This involves testing a series of increasingly restrictive hypotheses, each step examining a particular type of invariance: (a) configural invariance (i.e., same factors across groups), (b) metric invariance (i.e., equal loadings), and (c) equivalence of construct variance and covariance (i.e., equal measurement error variances-covariances; Byrne, 2006). CFA was performed on samples of 85 participants age 14 to 30 years ($M_{age} = 20.42$, $SD = 3.32$) and 82 retired participants age 60 to 89 years ($M_{age} = 72.75$, $SD = 7.42$) and showed good fit to the data (NNFI and CFI > .90; RMSEA < .06). The first invariance (configural) was tested across the two groups simultaneously without placing any constraints. The model yielded acceptable fit indices, $\chi^2(100) = 111.97$, $p > .19$; NNFI = .97; CFI = .98; RMSEA = .03; CI RMSEA = .00/.05. Next, metric invariance was tested by constraining all factor loadings to be equal across groups. Again, fit indices were

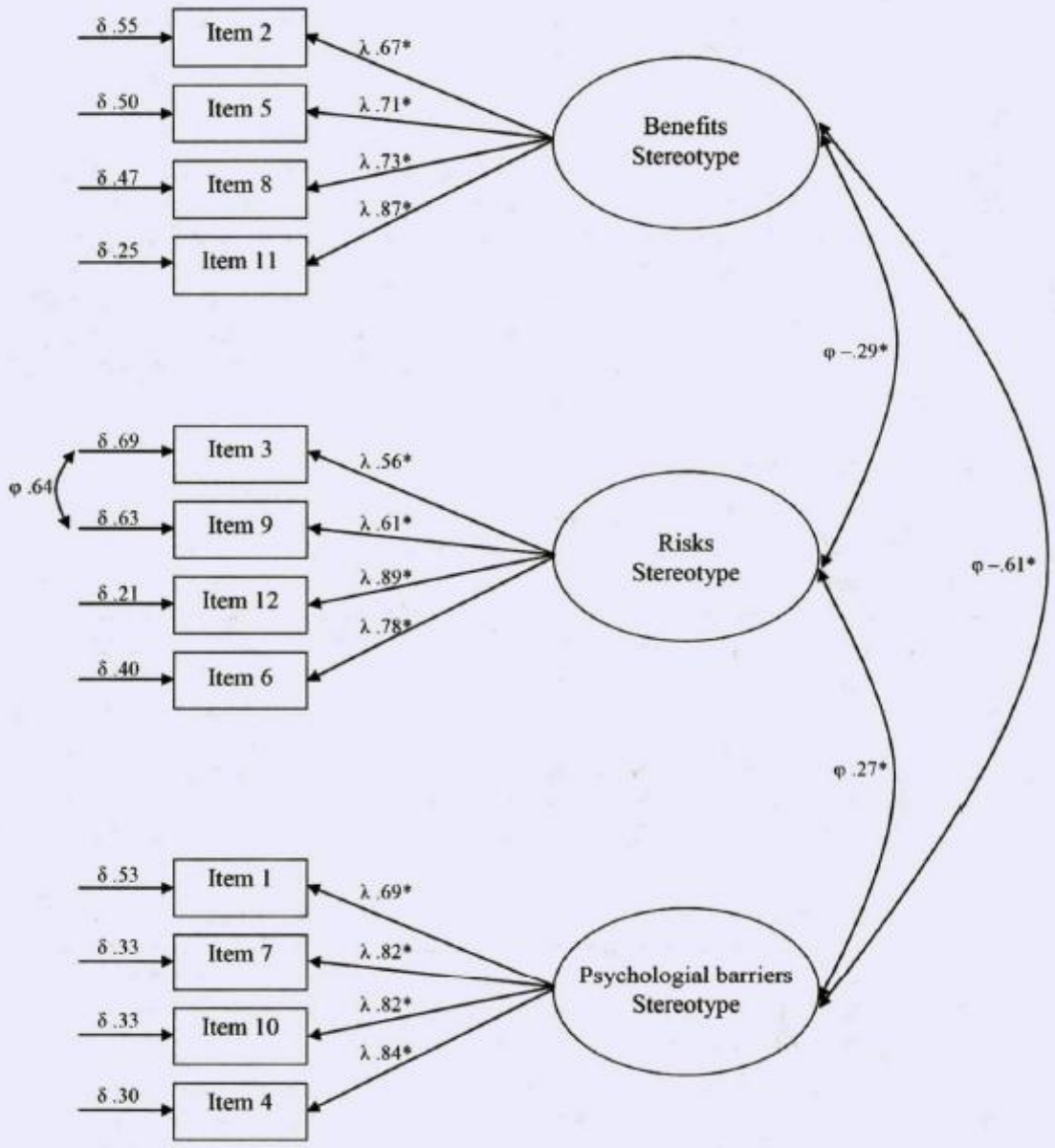

Figure 1 — Coefficients of estimation and standard error of measurement of the Aging Stereotypes and Exercise Scale (Study 2). *Note.* λ = standardized factor loadings; φ = correlations between latent factors; δ = standard errors of measurement of latent factor indicators; $*p < .05$.

acceptable, $\chi^2(109) = 127.31$, $p > .11$; NNFI = .96; CFI = .97; RMSEA = .03; CI RMSEA = .00/.05. Finally, equivalence of construct variance and covariance was examined. The model showed good fit to the data, $\chi^2(128) = 152.51$, $p > .07$; NNFI = .95; CFI = .95; RMSEA = .03; CI RMSEA = .00/.05. Overall, these results suggest that the factorial structure of the ASES was similar across age.

Stereotype Content. After having confirmed the three-factor structure of the scale and its invariance across age, we next examined the content of participants' responses. We did so by examining whether beliefs about older adults in the exercise domain were positive or negative. Overall, the results showed that the beliefs were positive. Exercise was on average perceived as beneficial ($M = 5.96$, $SD = 1.09$) for older adults and as presenting few risks for their physical health ($M = 2.70$, $SD = 1.27$). Beliefs about older adults' psychological barriers to exercise were also rather positive, but to a lesser degree ($M = 3.44$, $SD = 1.40$).

The beliefs differed by age. Although both age groups held positive beliefs about exercise outcomes, some differences emerged: Older adults considered exercise as more beneficial for other older adults ($M = 6.25$, $SD = 1.11$) than the younger participants did ($M = 5.46$, $SD = 0.96$), $t(165) = -4.78$, $p < .001$, and as less risky ($M = 2.57$, $SD = 1.28$) than these younger individuals did ($M = 2.96$, $SD = 1.14$), $t(165) = 1.97$, $p = .05$. Beliefs about older adults' psychological barriers also differed by age: Whereas younger participants thought that psychological barriers (i.e., lack of self-efficacy and motivation) might prevent older adults from exercising ($M = 4.26$, $SD = 1.01$), this belief was not shared by older adults ($M = 2.79$, $SD = 1.43$), $t(165) = 7.29$, $p < .001$. A possible explanation for this difference in belief with age is that, unlike younger adults, older adults are directly concerned by aging stereotypes. Therefore, they are likely to mount defenses against them to have a positive image of their age group (e.g., Levy, 2009).

Study 3: Temporal Stability of the ASES

Study 3 tested the reliability of the ASES over time in younger people. This age population was chosen because negative aging stereotypes held earlier in life have been shown to have important consequences when entering old age, as they may result in worse health (Levy et al., 2009). Eighty college students ($M_{age} = 19.75$, $SD = 1.14$; 65 men and 15 women) voluntarily completed the ASES twice with a 6-week interval between. The results showed moderate correlations, indicating that responses to the three subscales were stable over time, $r_{benefits} = .57$, $p < 001$; $r_{risks} = .59$, $p < 001$; and $r_{psychological\ barriers} = .53$, $p < 001$.

Study 4: External Validity of the ASES

The goal of Study 4 was to test the external validity of the ASES by examining whether the responses to this scale are related to variables previously identified as correlates of stereotype endorsement. The variables were drawn from stereotype-embodiment theory (e.g., Levy, 2009), which posits that assimilating stereotypes from the surrounding culture affects self-perceptions, which in turn influence functioning and health (e.g., Levy & Myers, 2004; Sanchez Palacios et al., 2009). Based on this literature, we hypothesized that endorsement of negative aging stereotypes in exercise would be related to negative self-perceptions among older adults—more particularly physical self-worth and self-rated health—and to lower exercise participation.

In addition, we expected endorsement of negative stereotypes to be related to increased subjective age (i.e., how old a person feels; e.g., Barrett, 2005) among

older adults. Past research has shown that the majority of older people report a youthful bias by feeling and perceiving themselves to be younger than their chronological age (Gana, Alaphilippe, & Bailly, 2004; Rubin & Berntsen, 2006). This youthful bias has been found to influence susceptibility to aging stereotypes and may be a compensatory strategy that people use to counteract the negative stereotypes associated with aging (e.g., Eibach, Mock, & Courtney, 2010; Schafer & Shippee, 2010). We thus predicted that older adults' youthful bias would be related to endorsement of aging stereotypes in exercise.

Finally, based on the assumption that aging stereotypes have negative consequences when entering old age (e.g., Levy et al., 2009), we predicted that the relationships between stereotype endorsement, self-perceptions, and exercise participation would be observed among older adults but not among younger adults.

Method

Participants and Procedure. Seventy-six retired individuals (M_{age} = 69.26, SD = 6.17; 19 men and 57 women) and 90 undergraduate students (M_{age} = 20.48, SD = 1.31; 42 men and 48 women) filled out a questionnaire on a voluntary basis during a course they were taking at a seniors' college or at Nice Sophia Antipolis University. Before retiring, 50.7% of older adults had been senior managerial staff, 41.1% middle managers, 5.5% employees, and 2.7% merchants. Concerning undergraduate students, 26.6% of their parents were senior managerial staff, 17.8% were middle managers, 29.9% were employees, 6.7% were blue-collar workers, and 18.9% were merchants. Sixty-five retired participants (86%) and 81 undergraduate students (90%) exercised at least once a week.

Measures. The questionnaire included measures of physical self-worth, self-rated health, exercise participation, and subjective age.

The ASES. The 12-item scale developed in Study 2 was used in this study. Each subscale presented good reliability, $\alpha_{benefits}$ = .84, α_{risks} = .78, and $\alpha_{psychological\ barriers}$ = .83.

Physical self-worth was assessed using the French-language validation (Ninot, Delignières, & Fortes, 2000) of the Physical Self-Perception Profile (Fox & Corbin, 1989). More particularly, the five items of the physical self-worth subscale of this questionnaire were included in the current study (e.g., "I am proud of who I am and what I can do physically"). Participants answered on a 7-point Likert scale, ranging from 1 (*completely disagree*) to 7 (*completely agree*). This scale showed high reliability, α = .95.

Self-rated health was assessed by the following item: "As a whole, how do you rate your current health?" (e.g., Benyamini, Leventhal, & Leventhal, 2003). Participants responded on a 6-point scale ranging from 1 (*poor*) to 6 (*excellent*).

Exercise Participation. Based on Renner, Spivak, Kwon, and Schwarzer (2007) and the French-language version of the Modifiable Activity Questionnaire (Vuillemin et al., 2000), we asked the participants to report all regular leisure-time physical activities over the past 12 months and how often they usually participated in each activity during a regular week. Responses were summed for each activity to obtain a total frequency of exercise participation per week.

Subjective age referred to felt age (e.g., Kleinspehn-Ammerlahn, Kotter-Grühn, & Smith, 2008; Schafer & Shippee, 2010; Uotinen, Rantanen, Suutama, & Ruoppila, 2006; Westerhof & Barrett, 2005) and was measured by the following question: "What age do you feel most of the time?" Subjective age was then indexed by the difference between participants' actual age and felt age, a positive or negative) value denoting a youthful or older subjective age, respectively.

Results and Discussion

Moderated regression analyses tested the effects of stereotype endorsement, age group (younger vs. older adults), and the Stereotype Endorsement × Age Group interaction on self-perceptions and exercise participation. Stereotype endorsement was centered around the sample mean, and age group was dummy coded (0 = younger adults, 1 = older adults). Analyses were conducted separately for each stereotype component.

Concerning the benefits-of-exercise stereotype, only the interaction effect between stereotype endorsement and age group on youthful bias was significant ($\beta = -.39$, $p < .001$). Simple slope analyses indicated that stereotype endorsement predicted youthful bias among older adults ($\beta = -.47$, $p < .001$) but not among younger ones ($\beta = .03$, $p = .80$). In other words, less stereotype endorsement predicted higher youthful bias. Significant simple effects of age on youthful bias ($\beta = .60$, $p < .001$) and on exercise participation ($\beta = -.20$, $p = .01$) also emerged.

Concerning the risks-of-exercise stereotype, there was no significant simple effect of this stereotype component or significant interaction effect with age. Only a significant simple effect of age was observed on self-rated health ($\beta = .16$, $p = .04$), youthful bias ($\beta = .55$, $p < .001$), and exercise participation ($\beta = -.20$, $p = .01$).

Concerning the psychological-barriers stereotype, results showed that the interaction effect between stereotype endorsement and age group on physical self-worth approached significance ($\beta = -.22$, $p = .08$). Simple slope analyses revealed that stereotype endorsement predicted physical self-worth among older adults ($\beta = -.26$, $p < .05$) but not among younger adults ($\beta = .07$, $p = .60$). Analyses of self-rated health showed only a marginal simple effect of age ($\beta = -.16$, $p = .09$), whereas both the simple effect of age ($\beta = .68$, $p < .001$) and the interaction effect ($\beta = .31$, $p = .003$) were significant on youthful bias. Specifically, the more older adults endorsed the stereotype that they do not have sufficient psychological abilities to exercise regularly, the lower their youthful bias ($\beta = .45$, $p < .001$). This relationship was not significant among younger adults ($\beta = -.01$, $p = .93$). Finally, only a significant simple effect of age was found on exercise participation ($\beta = .22$, $p = .02$).

Overall, in accordance with the literature, these results confirm that stereotype endorsement is associated with self-perceptions and that these relationships are observed among older adults only.

General Discussion

The goal of this research was to develop a measure of aging stereotypes in the exercise domain. Although aging stereotypes have been extensively studied (e.g., Levy, 2009), the content of these beliefs with regard to exercise remains relatively

unknown. What beliefs do people share about exercise outcomes for older adults and their abilities to exercise regularly? Are these stereotypes positive or negative? Investigating these questions is important insofar as stereotypes may affect behaviors, including exercise participation (e.g., Levy & Myers, 2004; Sanchez Palacios et al., 2009). Specifically, endorsement of exercise-related aging stereotypes could lead older individuals to impose barriers to exercise participation on themselves, such as believing that they are too old to exercise (e.g., Booth et al., 2002; Netz et al., 2008).

Therefore, we believe that elaborating a measure of these stereotypes may allow a deeper understanding of the role of aging stereotypes in the low exercise-participation rate observed among older adults (e.g., World Health Organization, 2001). The current research aimed to develop such a measure, the ASES, which was elaborated from the literature on barriers to exercise among older adults (e.g., Resnick, 2005; Vlachopoulos et al., 2010).

Four studies were conducted to validate the ASES, involving 714 participants who varied in age, socioeconomic status, and level of exercise participation. A three-factor structure emerged from the principal-axis factor analyses conducted in Study 1 and was corroborated by CFA in Study 2. This structure included three factors measuring stereotypes about benefits and risks of exercise and stereotypes about older adults' psychological barriers to exercise (i.e., lack of self-efficacy and motivation). In other words, the ASES measures stereotypes about exercise outcomes for older adults and their psychological abilities to exercise regularly.

Study 2 also revealed that the factorial structure of the scale was invariant across age but that younger and older individuals differed in the content of their beliefs about older adults. More particularly, although both age groups held positive beliefs about exercise outcomes by believing that exercise may be highly beneficial and of low risk for older adults, these beliefs were less positive among younger individuals. Moreover, contrary to older adults, younger individuals did not hold positive beliefs about older adults' psychological abilities to exercise on a regular basis. Indeed, they believed on average that older adults are not confident in their ability to exercise and do not want to make the effort to exercise regularly. Two complementary hypotheses may explain these differences between age groups. On the one hand, for younger individuals, aging stereotypes concern a group to which they do not belong. Therefore, they do not need to mount defenses against these stereotypes, resulting in beliefs that may be negative. This finding corroborates the assumption of stereotype-embodiment theory (Levy, 2009) that individuals are particularly likely to develop negative aging stereotypes during childhood and adulthood because at this time these stereotypes have no strong self-referential implications (see also Rothermund & Brandtstädter, 2003). In contrast, for older adults, aging stereotypes concern their own group. In line with research showing that a youthful bias serves as a self-enhancing positive illusion (e.g., Gana et al., 2004), holding positive stereotypes may be considered a self-enhancing perception that helps older adults cope with age-related decline. On the other hand, older adults may hold more positive stereotypes than younger ones on the basis of their own positive experiences (e.g., Rothermund & Brandtstädter, 2003). In other words, when entering old age, aging stereotypes may reflect a projection of people's own experiences.

Study 4 showed that endorsement of negative aging stereotypes in the exercise domain is related to older adults' self-perceptions, such as physical self-worth and youthful bias, but not to younger adults' self-perceptions. These findings corroborate past results indicating that aging stereotypes are internalized when they become self-relevant (i.e., when entering old age), resulting in negative self-views (e.g., Levy, 2009; Rothermund & Brandtstädter, 2003).

Last, although a rigorous validation procedure has been used to elaborate the ASES, some limitations exist. For example, the samples used in the studies were selective, comprising a majority of highly educated people who were physically active. This could explain why stereotype endorsement was not related to exercise participation in Study 4, whereas this relationship has been observed in past studies (e.g., Wurm et al., 2010). Moreover, while the ASES measures stereotypes about exercise in general (and not sport in particular), younger and older adults may have different representations of exercise. For example, younger adults may think of exercise as running while older adults may think of exercise as walking. It would be interesting to take into account these differences or to extend the ASES to beliefs about physical activity in general (e.g., housework, gardening) to deepen our understanding of the content of aging stereotypes in this domain. In addition, Study 4 used a cross-sectional design to test the differences in stereotype internalization between age groups; thus, future research should investigate such developmental processes based on a longitudinal design. Finally, the temporal stability of the ASES has been examined with younger adults only; whether the ASES is stable over time among older adults remains an empirical question.

Overall, these findings suggest that the ASES may be a relevant instrument to investigate the role of aging stereotypes in exercise-related behaviors. It would be interesting to examine in future studies whether endorsement of these stereotypes has long-term effects on older adults' self-perceptions and exercise participation. The ASES could also be used to study the antecedents of stereotype endorsement, such as personality traits and past exercise participation. In sum, we believe that the development of an aging-stereotypes measure specific to the exercise domain may open the door to promising research on the determinants of older adults' exercise participation.

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Synthèse de l'étude 1

La première étude de ce travail doctoral fait partie d'un programme de recherche dont l'objectif était de développer et valider un outil psychométrique mesurant les stéréotypes liés au vieillissement dans le domaine de l'activité physique (*Aging Stereotypes and Exercise Scale* ; ASES). En effet, cette thèse a débuté au cours du développement de ce questionnaire, notamment lors du test de la validité externe. Cette échelle a été validée selon la procédure de validation transculturelle préconisée par Vallerand (1989). Quatre études impliquant 714 participants ont ainsi été conduites successivement afin d'examiner la structure factorielle, l'invariance, la stabilité temporelle, et la validité externe de l'outil.

L'étude 1 a permis de retenir 12 items divisés en 3 sous-échelles : (a) les stéréotypes liés à l'auto-efficacité et la motivation (4 items ; e.g., *les seniors sont convaincus qu'ils sont capables de faire de l'activité physique*) ; (b) les stéréotypes liés aux bénéfices de l'activité physique (4 items ; e.g., *l'activité physique améliore le*

sentiment de bien-être des seniors) ; et (c) les stéréotypes liés aux risques de l'activité physique (4 items ; e.g., *les seniors n'ont pas assez de résistance physique pour pratiquer une activité physique*). L'étude 2 a permis de (a) confirmer la structure factorielle des 12 items par l'intermédiaire d'une analyse factorielle confirmatoire et (b) tester l'invariance liée à l'âge. L'étude 3 a testé la stabilité temporelle du questionnaire. Enfin, l'étude 4 a testé la validation externe de l'ASES, en montrant que l'adhésion aux stéréotypes négatifs liés au vieillissement était associée aux perceptions de soi (i.e., valeur physique perçue, âge subjectif), ceci confirmant les résultats des travaux antérieurs (e.g., Levy, 2009 ; Rothermund & Brandtstädter, 2003).

Le développement et la validation de ce questionnaire ont permis de compléter la littérature scientifique existante sur la mesure des barrières psychologiques liées à l'activité physique chez les seniors (e.g.. Booth et al., 2002 ; Netz, Zeev, Arnon, & Tenenbaum, 2008 ; Vlachopoulos, Letsiou, Palaiologou, Leptokaridou, & Gigoudi, 2010). Cet outil permet d'envisager la réalisation d'études visant une meilleure compréhension du rôle de l'internalisation des stéréotypes liés au vieillissement (Levy, 2009) dans le faible engagement des seniors dans l'activité physique. En effet, les travaux basés sur la théorie du *stereotype embodiment* (Levy, 2009) ont montré que les stéréotypes internalisés tout au long de la vie avaient des effets sur les comportements de santé (Levy et al., 2002). En se basant sur de tels résultats, nous pouvons supposer que l'internalisation des stéréotypes négatifs liés au vieillissement pourrait également influencer la pratique d'une activité physique chez les seniors. La vérification de cette hypothèse a fait l'objet de la deuxième étude de ce travail doctoral.

ETUDE 2

Aging stereotypes and active lifestyle: Personal correlates of stereotype internalization and relationships with level of physical activity among older adults[1]

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[1] Cet article a fait l'objet d'une publication :
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Aging stereotypes and active lifestyle: Personal correlates of stereotype internalization and relationships with level of physical activity among older adults

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ABSTRACT

Objectives: The goal of this study was to identify the personal correlates (openness to experience and implicit theories of ability) of internalization of aging stereotypes and its relationships with physical activity.
Design: Cross-sectional survey.
Method: One hundred and ninety-two older adults (78 men and 114 women) from 60 to 93 years (M_{age} = 73.44, SD = 7.34) completed a series of questionnaires measuring openness to experience, implicit theories of ability, stereotypes about older people and physical activity, attitude toward own aging, physical self-worth, physical activity level, self-rated health and education level.
Results: The main results showed that (a) openness to experience positively predicted physical activity level through incremental theories, endorsement of aging stereotypes relative to benefits, attitude toward own aging, and physical self-worth; and (b) entity theories negatively predicted physical activity level through endorsement of aging stereotypes relative to risks, attitude toward own aging, and physical self-worth.
Conclusion: The present study indicates that openness to experience and implicit theories of ability are correlates of endorsement of aging stereotypes and suggests that endorsement may be an important factor of engagement in physical activity in older adults.

Introduction

Physical activity (PA) is an important factor of successful aging and helps to prevent the cognitive and functional decline associated with the aging process (e.g., Paterson & Warburton, 2010; Renner, Spivak, Kwon, & Schwarzer, 2007; Warburton, Nicol, & Bredin, 2006). Despite these benefits, nearly 60% of people aged 65 years and over are physically inactive (Hallal et al., 2012). Physical inactivity has been defined as not meeting any of three criteria: (a) 30 min of moderate-intensity physical activity on at least 5 days every week, (b) 20 min of vigorous-intensity physical activity on at least 3 days every week, or (c) an equivalent combination achieving 600 metabolic equivalent (MET)-min per week (World Health Organization, 2011). Several factors may explain this inactivity, including physical, material, social, and psychological barriers. The current article focuses on one particular barrier: the internalization of negative aging stereotypes (i.e., belief that a stereotype is true for oneself) related to (a) the ability of older adults to adopt an active lifestyle and (b) the effects of physical activity on older adults' health (Chalabaev et al., 2013). The purpose of this study was to better understand the personal correlates (openness to experience and implicit theories of ability) of the internalization of aging stereotypes and its relationships with PA-related variables.

Aging stereotypes and health-related behaviors

Stereotypes can be defined as shared beliefs about the personal characteristics, usually personality traits but also behaviors, of a

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group of people (Leyens, Yzerbyt, & Schadron, 1994). According to the stereotype embodiment theory (Levy, 2009), aging stereotypes are internalized throughout the lifespan. There is evidence that endorsement of aging stereotypes, operationalized in terms of self-perceptions of aging, predict older adults' preventive health behaviors notably with regard to food, alcohol and tobacco consumption (Levy & Myers, 2004), health (Levy, Zonderman, Slade, & Ferrucci, 2009) and survival (Levy, Slade, Kunkel, & Kasl, 2002).

Little research to our knowledge has examined the relationship between the internalization of stereotypes and the adoption of an active lifestyle, although this relationship has been examined through the concept of self-perceptions of aging, which is considered a marker of stereotype internalization (e.g., Levy, Slade, & Kasl, 2002). Two studies showed that older adults' self-perceptions of aging were positively related to physical activity behaviors (e.g., Wurm, Tesch-Römer, & Tomasik, 2007; Wurm, Tomasik, & Tesch-Römer, 2010). Specifically, older adults with a positive view of aging participated in physical activity more frequently than those with a less positive view. Another study by Sánchez Palacios, Torres, and Blanca Mena (2009) showed that the endorsement of negative aging stereotypes (relative to health, social activity and personality) was negatively related to physical activity participation. However, endorsement of stereotypes was not examined in relationship to self-perceptions of aging in this study, and it is therefore difficult to determine whether the results were due to stereotype internalization. Although these studies suggest that the internalization of aging stereotypes may affect the adoption of an active lifestyle in older adults, more studies are needed to provide additional evidence of this relationship. Notably, what are the processes through which stereotype internalization affects physical activity participation? Based on the assumption of stereotype embodiment theory that endorsement of aging stereotypes predicts self-perceptions (Levy, 2009), we examined the role of physical self-worth in stereotype embodiment processes. Physical self-worth is known to be positively related to physical activity (Fox & Corbin, 1989). A recent study showed that the endorsement of aging stereotypes specific to PA is related to physical self-worth (Chalabaev et al., 2013). Specifically, the more older adults endorsed negative stereotypes about older adults' abilities to be physically active, the lower their confidence in their physical self and self-rated health. In addition, given the consequences stereotypes may have on health-related behaviors, identifying the factors of stereotype endorsement seems important. To examine what makes a person prone to adhere to negative stereotypes, we studied the role of two personal variables: openness to experience and implicit theories of ability.

Openness to experience, stereotype endorsement and physical activity

Openness to experience, which refers to the tendency to seek out new and unusual experiences, is one of the personality traits defined in the five-factor model of personality (Costa & McCrae, 1992). According to McCrae (1987), openness to experience is associated with flexibility and attraction for unconventional ideas. In other words, the more individuals are open to experience, the more they adapt rapidly and effectively to unexpected changes (Lepine, Colquitt, & Erez, 2006). Therefore, it can be hypothesized that openness to experience protects older adults from internalizing negative aging stereotypes. To our knowledge, no study has examined how openness to experience affects endorsement of self-stereotypes. Existing research indicates that openness to experience is related to self-perceptions of aging operationalized in terms of subjective age (i.e., how young or old people experience themselves to be) (Canada, Stephan, Caudroit, & Jaconelli, 2013; Stephan, Demulier, & Terracciano, 2012). These studies demonstrated the more open to experience older adults are, the younger their subjective age will be. In turn, satisfaction with one's own aging and feeling young are indicators of positive well-being in late life (Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009). This suggests that openness to experience may predict successful aging through stereotype internalization processes.

Furthermore, several studies have shown that openness to experience is associated with some of the variables associated with successful aging, including better cognitive performance (e.g., Costa & McCrae, 1992; Gregory, Nettelbeck, & Wilson, 2010; Stern, 2003, 2006), life satisfaction (e.g., Stephan, 2009), and engagement in novel activities (intellectual or cultural) that help maintain older adults' cognitive function and health (Olson, 2005; Paunonen & Ashton, 2001). With regard to physical health, studies have shown that openness to experience is associated with a reduced risk of walking limitation in older adults (e.g., Tolea et al., 2012) and better functional status (Duberstein et al., 2003). This relationship is possibly due to the adoption of an active lifestyle. However, inconsistent results are observed concerning the relationship between openness to experience and PA. Although Courneya, Friedenreich, Sela, Quinney, and Rhodes (2002) showed that openness to experience was positively associated with physical activity, the meta-analysis of Rhodes and Smith (2006) did not confirm this relationship. It is therefore possible that the link between openness to experience and PA is not direct and that this trait predicts PA through a chain of indirect processes. We tested the role of stereotype internalization in these processes.

Implicit theories of ability and stereotypes

Another personal attribute that may be related to physical activity stereotypes concerns the implicit theories of ability. Implicit theories refer to the two assumptions people may make about the malleability of personal attributes: they may believe that a highly valued personal attribute, such as intelligence, personality or morality, is a fixed, nonmalleable trait-like entity (*entity theory*), or that the attribute is a malleable quality that can be changed and developed (*incremental theory*) (Dweck, 1986; Dweck & Legett, 1988). In the PA domain, several studies have shown that adopting an incremental theory of sport ability is associated with more positive cognitive and emotional consequences than adopting an entity theory (e.g., Ommundsen, 2003; Sarrazin et al., 1996).

Previous research suggests that implicit theories of ability may be related to stereotypes. For example, a study of Bagès and Martinot (2011) showed that presenting female students with a hardworking role model reduced the negative effects of gender stereotypes on their performance in mathematics. Another study revealed that females who thought that the ability to be a leader was fixed (i.e., thus adopting an entity theory) and who had a low sense of self-efficacy reported lower self-evaluation when reminded of negative gender stereotypes than females adopting an incremental theory of leadership ability (Burnette, Pollack, & Hoyt, 2010). Although one might hypothesize that incremental theories of ability are a protective factor with regard to negative stereotypes, no study to date has explored these relationships in the PA domain. In this study, we tested the hypothesis that incremental theories mediate the relationship between openness to experience and stereotype endorsement. Past research indeed indicates that people who are open to experience are more prone to adopt incremental theories of ability (Spinath, Spinath, Riemann, & Angleitner, 2003).

The present study and hypotheses

In brief, the goals of the present study were twofold: (a) to examine whether endorsement of aging stereotypes predicts

engagement in PA among older adults and whether physical self-worth has a mediating role in this relationship, and (b) to examine the personal correlates of stereotype endorsement, namely openness to experience and implicit theories of ability. More particularly, we operationalized the internalization of aging stereotypes in two ways: endorsement of aging stereotypes about PA (Chalabaev et al., 2013) and self-perceptions of older adults' own aging (e.g., Levy, 2009). We assumed that these two measures would provide complementary information on the role of the internalization of aging stereotypes in the adoption of an active lifestyle. Indeed, although self-perceptions of aging are usually considered a marker of stereotype internalization, we reasoned that examining the relationships between endorsement of aging stereotypes and self-perceptions in the stereotyped domain would constitute a more indirect way of measuring stereotype internalization. Moreover, aging stereotypes that are specific to the PA domain may be more sensitive to personal correlates that are specific to this domain (i.e., implicit theories of sport ability), while self-perceptions of aging in general may be more related to personal correlates that are global (i.e., openness to experience), as suggested by evidence that openness to experience is related to subjective age (e.g., Canada et al., 2013; Stephan et al., 2012). We also reasoned that attitude toward own aging would be a more proximal factor of PA than endorsement of stereotypes about older adults, as the former corresponds to the assimilation of stereotypes into the self, whereas the latter refers to beliefs about the older adult group in general. Last, we examined the mediating role of physical self-worth in the aging stereotypes-PA relationship, as past research has shown that endorsement of aging stereotypes in physical activity predicts this variable (Chalabaev et al., 2013).

We tested a hypothetical model in which openness to experience predicts implicit theories of ability (i.e., entity and incremental theories), which in turn predict endorsement of aging stereotypes in PA. We also hypothesized that endorsement of aging stereotypes relative to benefits and psychological capacities would positively predict the level of PA, directly and through attitude toward own aging and physical self-worth. In contrast, endorsement of aging stereotypes relative to risks was expected to be negatively related to the level of PA, directly and through attitude toward own aging and physical self-worth. Self-rated health and education level were used as control variables, as these variables may affect health-related behaviors (e.g., Levy et al., 2002).

Method

Participants

A total of 192 retired individuals (78 men and 114 women) aged 60–93 years ($M = 73.44$, $SD = 7.34$), and residing in the south of France, participated in this study on a voluntary basis. The participants met the following inclusion criteria: (a) aged 60 years and older, (b) being free from severe functional, mental or cognitive impairment, and (c) living independently in the community. Of the initial 322 eligible individuals, 68 were excluded because of health problems, and 62 because of missing data. Concerning education level, 31.8% of the participants had not obtained the baccalaureate degree, 39.6% had a baccalaureate degree, and 28.6% had a university degree.

Measures

Openness to experience

Openness to experience was measured using the corresponding subscale of the *Big Five Inventory* (*BFI*) developed by John and Srivastava (1999), which was translated and validated in French (*BFI-Fr*) by Plaisant, Courtois, Réveillère, Mendelsohn, and John (2010). This subscale consists of ten items (e.g., "I see myself as someone who is creative, full of original ideas") and participants answer on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The internal consistency of the subscale was satisfactory ($\alpha = .79$).

Implicit theories of ability

Entity and incremental theories of ability were measured using the Conceptions of the Nature of Athletic Ability Questionnaire (CNAAQ) of Sarrazin et al. (1996). Given that we were interested in older adults' beliefs about physical activity, we replaced the term "sport" with "physical activity," which is in line with past research (Moreno, González-Cutre, Sicilia, & Spray, 2010; Ommundsen, 2003). This questionnaire consists of six items: three items measure beliefs relative to the stability of physical ability (e.g., "The level of ability in physical activity changes little even if efforts are made") and correspond to the adoption of an entity theory, and three items measure beliefs that physical ability can improve (e.g., "We must work hard to have a good level of ability in physical activity") and correspond to the adoption of an incremental theory. The participants answered on a 6-point Likert scale ranging from 1 (*completely disagree*) to 6 (*completely agree*). Confirmatory factor analyses (CFA) were performed with AMOS 21.0 (Arbuckle, 2006) to test the factorial structure of the scale. The model presented a good fit to the data [χ^2 (8) = 8.68, $p = .37$, $N = 192$, NNFI = .940, CFI = .995, RMSEA = .021, CI RMSEA = .00/.090]. Furthermore, each subscale presented good reliability ($\alpha_{\text{incremental theory}} = .78$, $\alpha_{\text{entity theory}} = .81$).

Stereotypes about older people and physical activity

Endorsement of aging stereotypes in PA was assessed using the *Aging Stereotypes and Exercise Scale* (ASES) (Chalabaev et al., 2013). This questionnaire consists of 12 items divided into three subscales: (a) psychological capacities (e.g., "older adults are convinced that they are capable of exercising"), (b) a benefits stereotype (e.g., "exercise raises older adults' spirits"), and (c) a risks stereotype (e.g., "the physical capacities of older adults are too diminished for exercise"). The participants responded on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). In this study, each subscale presented good reliability ($\alpha_{\text{psychological capacities}} = .80$, $\alpha_{\text{benefits of exercise}} = .87$, $\alpha_{\text{risks of exercise}} = .81$). In the French validated version, items include the term physical activity and not physical exercise.

Attitude toward own aging

The attitude of the elderly toward their own aging was measured by a French version of the *Attitude Toward Own Aging* scale (Liang & Bollen, 1983) consisting of five items (e.g., "I am happier now than I was before"). The participants responded on a 6-point Likert scale ranging from 1 (*completely disagree*) to 6 (*completely agree*). In this study, this scale presented good reliability ($\alpha = .78$).

Physical self-worth

Physical self-worth was measured using the corresponding subscale of the Physical Self Inventory (*PSI-25*), the French version of the Physical Self-Perception Profile (PSPP) of Fox and Corbin (1989), validated by Ninot, Delignières, and Fortes (2000). It consists of five items (e.g., "Overall, I am satisfied with my physical capacities"). The PSI is composed of 25 items and six subscales (global self-esteem, physical self-worth, endurance, sport competence, physical appearance, and physical strength). Participants answered on a 6-point Likert scale ranging from 1 (*completely disagree*) to 6 (*completely agree*). The internal consistency of the subscale was satisfactory ($\alpha = .89$).

Physical activity level

PA level was calculated for each participant from the Dijon Physical Activity Score of Robert et al. (2004), which is based on a nine-item scale. This questionnaire was specifically developed to assess physical activity in a population of healthy, elderly subjects. The scale includes: (a) an overall appraisal of one's physical activity (e.g., "Do you consider yourself to be physically: (a) very active and athletic, to (d) completely sedentary?"); (b) two items on everyday activities (e.g., "On a weekly basis, your everyday activities take you: (a) more than 10 h, to (e) no time spent"); (c) five items on sport and leisure activities (e.g., "For how many months of the year do you engage in these activities (sport or leisure)?"); and (d) one item on rest (e.g., "On a daily basis, you rest (sleep, nap or wakeful rest): (a) less than 12 h, to (d) more than 20 h"). The scores for the items are added, with the maximal score being 30 points, and this total score corresponds to a level of physical activity. Individuals who score below 18 are considered sedentary; those who score below 10 are very sedentary. The results of the questionnaire were reproducible and correlated with peak VO_2 and maximal power attained during a stress test in older adults (Robert et al., 2004). The psychometric properties of this questionnaire were also reported in other studies of coronary artery disease patients (Gremeaux et al., 2008; Guiraud, Granger, Bousquet, & Gremeaux, 2012).

Covariates

The covariates for this study were education level and self-rated health. These variables were chosen because past research has shown that they are related to physical activity engagement (Shaw & Spokane, 2008), physical activity stereotypes (Chalabaev et al., 2013), and health-related behaviors (Levy et al., 2002) in older adults.

Self-rated health

Self-rated health was measured by the following item: "In general, how would you rate your current health status?" Participants answered on a 6-point Likert scale ranging from 1 (*very bad*) to 6 (*very good*) (Benyamini, Leventhal, & Leventhal, 2003).

Education level

Education level was assessed by the following item "What is your highest diploma?"

Procedure

Participants were older individuals belonging to a regional health organization based in the South of France. This organization comprises roughly 50,000 members, with 22,000 members older than 60 years. The researchers examined the organization's records to select 500 participants who met the inclusion criteria. Participants were informed about the study through the organization newsletter, by email, or directly on site. A total of 322 agreed to participate and filled in the questionnaires. The research procedure was approved by the University of Nice Sophia-Antipolis research ethics board. Written informed consent was obtained from all participants. After filling out a consent form describing the study as an investigation on the determinants of health in older adults, the participants were asked to answer a series of computerized questionnaires individually in a separate room. Participants who were uncomfortable with computers filled out a paper version of the questionnaires. A researcher was present to assist participants and answer any questions. The average time to completion was 15 min.

Data analyses

A path analysis model was tested with AMOS 21.0 (Arbuckle, 2006). Mardia's coefficient, which is an indicator of the multinormality of the data, presented a value 21.80, higher than the usually recommended maximum value of 5 (Yuan, Bentler, & Zhang, 2005). The robust maximum likelihood estimation method was thus employed. As recommended by several authors (e.g., Byrne, 2005; Hu & Bentler, 1999; Vanderberg & Lance, 2000), fit indices included measures of both absolute (η^2 and degrees-of-freedom) and incremental (CFI) fit. In addition, we chose the Root Mean Square Error of Approximation (RMSEA) (Browne & Cudeck, 1993) as an indicator of error in the approximation of the hypothesized model to the population and the RMSEA 90% confidence interval (RMSEA 90% CI). Adequate fit is normally assumed when CFI is equal to or greater than .90. An RMSEA value equal to or less than .08 indicates a fair fit (Hu & Bentler, 1999).

Results

Descriptive analyses

Means, standard deviations, and correlations for each dependent variable are presented in Table 1. Pearson's correlations showed that (a) endorsement of aging stereotypes relative to benefits was positively correlated with attitude toward own aging, physical self-worth, self-rated health, and the level of PA, and negatively correlated with entity theories; (b) endorsement of aging stereotypes relative to psychological capacities was positively correlated with attitude toward own aging, physical self-worth, self-rated health, education level, and PA level; and (c) endorsement of aging stereotypes relative to risks was negatively correlated with attitude toward own aging, physical self-worth, self-rated health, and the level of PA, and positively correlated with entity theories.

Table 1
Descriptive statistics and matrix of Pearson *r* correlation coefficients between the variables ($N = 192$).

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Incremental theories	4.55	.92	–										
2. Entity theories	3.43	1.02	.10	–									
3. Openness to experience	4.00	.73	.29**	−.02	–								
4. Psychological capacities	4.36	.89	.05	.06	.06	–							
5. Exercise benefits	5.22	.74	.09	−.16*	.09	.48**	–						
6. Exercise risks	2.57	1.03	.02	.33**	.05	−.16**	−.33**	–					
7. Attitude toward own aging	4.28	1.02	−.02	−.23*	.15*	.21**	.34**	−.37**	–				
8. Physical self-worth	4.11	1.07	−.04	−.12	.14*	.25**	.34**	−.27**	.72**	–			
9. Level of physical activity	17.88	5.29	−.13	−.11	.00	.16*	.27**	−.28**	.44**	.45**	–		
10. Perceived health	4.26	.89	−.09	−.18*	.08	.17*	.31**	−.29**	.46**	.44**	.38**	–	
11. Education level	3.76	1.10	−.04	−.10	.06	−.15*	.05	−.10	.02	−.11	−.02	−.07	–

Note. *M*: mean; SD: standard deviations.
*$p < .05$, **$p < .01$.

Testing the hypothesized model

The next step involved testing the hypothetical model. Bootstrap resampling was performed since the data presented significant multivariate non-normality (normalized skewness and kurtosis: 22.22 and 9.10). This model showed a significantly and meaningfully better fit to the data [χ^2 (22) = 33.74, p = .052, N = 192, NNFI = .933, CFI = .974, RMSEA = .053, CI RMSEA = .00/.087]. The results indicated that openness to experience directly and positively predicted incremental theory (β = .27, p < .01) and attitude toward own aging (β = .14, p < .05). Entity theories positively predicted endorsement of aging stereotypes relative to risks (β = .27, p < .01) and tended to negatively predict endorsement of aging stereotypes relative to benefits (β = −.12, p = .07). Incremental theories positively predicted endorsement of aging stereotypes relative of benefits (β = .13, p < .05). The results (Fig. 1) with regard to endorsement of aging stereotypes in PA revealed that (a) stereotypes relative to psychological capacities tended to positively and indirectly predict the level of PA through physical self-worth (β = .09, p = .07), (b) stereotypes relative to benefits directly and positively predicted the level of PA (β = .14, p < .05) and indirectly through attitude toward own aging (β = .13, p < .05) and physical self-worth (β = .54, p < .01), and (c) stereotypes relative to risks directly and negatively predicted the level of PA (β = −.13, p < .05) and indirectly through attitude toward own aging (β = −.13, p < .05) and physical self-worth (β = .54, p < .01).

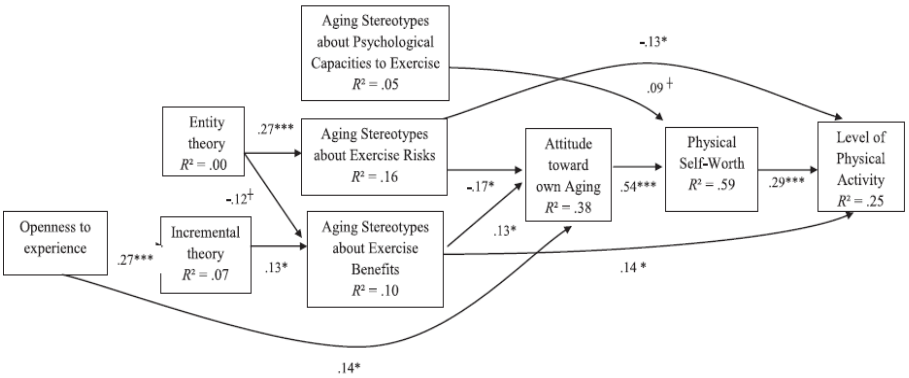
Corresponding squared multiple correlations (R^2) ranged from .05 (psychological capacities) to .59 (physical self-worth). Exogenous variables accounted for (a) 5% of the total variation in endorsement of aging stereotypes relative to older adults' psychological capacities; (b) 10% of the total variation in endorsement of aging stereotypes relative to benefits; and (c) 16% of the total variation in endorsement of aging stereotypes relative to risks. The model accounted for 25% of the variance in level of PA.

Discussion

The aim of this study was to better understand the personal correlates (openness to experience and implicit theories of ability) and relationships with internalization of aging stereotypes in the domain of PA. First, concerning the personal correlates of stereotype endorsement, we hypothesized that openness to experience would positively predict attitude toward own aging, because these two variables are global (i.e., not domain-specific), and that implicit theories of ability would predict internalization of stereotypes about PA, because these two variables are specific to the field of PA. Our results confirmed our hypotheses by showing that openness to experience was a positive predictor of attitude toward own aging. These findings confirmed the existing literature on the predictive character of openness to experience on successful aging with regard to subjective age (Canada et al., 2013; Stephan, 2009; Stephan et al., 2012). Moreover, our results indicated no relationship between openness to experience and stereotypes about older adults and physical activity. Our results showed a relationship between openness to experience and attitude toward own aging, confirming that this personality trait may attenuate the effect of internalization of negative stereotypes. This finding is consistent with those of Flynn (2005), who reported that white people open to experience were less biased by stereotypes when judging black targets, and extends them to self-stereotypes.

The hypothesis that implicit theories of ability predict the internalization of stereotypes about older adults and physical activity was partly confirmed. Our results indicated that entity theories positively and directly predicted endorsement of aging stereotypes relative to risks, and negatively predicted stereotypes relative to benefits. No relations between entity theories and endorsement of aging stereotypes relative to psychological capacities to physical activity regularly were showed. The finding that entity theories were positively related to endorsement of aging stereotypes relative to risks, and negatively to endorsement of aging stereotypes relative to benefits, is consistent with previous studies showing that entity theories are classically associated with maladaptative templates such as decreased performance and motivation (Da Fonseca et al., 2008; Dweck & Leggett, 1988; Ommundsen, 2001). In addition, incremental theories directly predicted endorsement of aging stereotypes relative to benefits. This result showed the malleable character of incremental theories and their relationship with positive performance (e.g., Da Fonseca et al., 2008; Dweck, 1986; Dweck & Leggett, 1988). Our findings support this literature by emphasizing the mediating role of stereotypes about older adults and physical activity between implicit theories of ability and attitude toward own aging.

A second objective of this study was to identify some of the relationships of aging stereotype internalization with regard to PA. We hypothesized that endorsement of aging stereotypes would predict the level of PA through self-perceptions such as older adults' attitude toward own aging and physical self-worth. The results showed that endorsement of stereotypes relative to benefits



Note. For clarity purposes, control variables and non significant paths are not included in the graph. †p < .07, *p < .05, ***p < .001

Fig. 1. Relations between openness to experience, and physical activity among older adults: the mediating roles of implicit theories of ability, internalization of stereotypes and physical self-worth.

positively predicted the level of PA directly and through attitude toward own aging and physical self-worth. Furthermore, endorsement of aging stereotypes relative to risks negatively predicted the level of PA directly and through attitude toward own aging and physical self-worth. Last, endorsement of aging stereotypes relative to psychological capacities to regularly physical activity indirectly predicted the level of PA through physical self-worth. This finding enriches the literature by highlighting the mediating role of attitude toward own aging and physical self-worth in the relationship between endorsement of aging stereotypes relative to risks and benefits and the level of PA.

Overall, these findings are consistent with previous studies on aging stereotypes and health behaviors (Levy & Myers, 2004; Wurm et al., 2010) showing that positive views of aging enhance the preventive health-related behaviors in older adults. The results add to the literature by showing that different measures of stereotype internalization may be relevant: self-perceptions of aging, which are often used within the framework of stereotype embodiment theory (Levy, 2009), as well as endorsement of aging stereotypes relative to the specific domain of PA (Chalabaev et al., 2013). In addition, the results provide evidence of the role of aging stereotypes in the adoption or maintenance of an active lifestyle in older adults, reinforcing the rare studies that have examined this question (e.g., Wurm et al., 2010).

Further research is needed to understand the factors and consequences of endorsement of aging stereotypes. First, the current study examined only one personality trait: openness to experience. Examining the role of other personality traits may provide additional understanding of the personal correlates of physical activity stereotype endorsement. For example, neuroticism, which has been shown to be related to attitude toward own aging and self-rated health among older adults (Moor, Zimprich, Schmitt, & Kliegel, 2006), could be considered. Second, the cross-sectional design used in this study informs us about the relationships between the measured variables at a point in time but does not provide evidence of causal relationships. It would thus be interesting to conduct a longitudinal study to examine the nature of these relationships over time. Also, an experimental manipulation of implicit theories of ability would provide greater insight into their effect on physical activity stereotype endorsement. Third, investigating the relationships between endorsement of aging stereotypes and a behavioral measure of PA (e.g., 6 min walk test, American Thoracic Society, 2002; Solway, Brooks, Lacasse, & Thomas, 2001; accelerometer) would extend our findings observed on self-reported physical activity. Last, the results of this study are specific to the characteristics of our sample. While the age and gender of the present sample were representative of the general French retired population, the level of education was much higher (NISES, 2011), which limits the generalizability of the findings. Future research should thus replicate this study with older people from lower levels of education to strengthen the generalizability of the findings.

Beyond these limitations, the present study adds to the literature in two important ways. First, we demonstrate that it is important to differentiate internalization of stereotypes at the global level (i.e., attitude toward own aging) and at the physical activity level in order to better understand engagement in PA. Second, we identified some personal correlates of stereotype internalization by showing that openness to experience might prevent individuals from internalizing aging stereotypes through incremental theories, while entity theories of ability would favor aging stereotypes about risks. These findings provide support for the idea that personal psychological attributes and internalization of physical activity stereotypes are important factors for understanding active lifestyles in the elderly. From a practical point of view, evaluating personality traits in older adults in order to identify individuals with low scores for openness might help to better recognize those who are vulnerable to negative stereotypes. More generally, our findings suggest it might be useful to foster physical activity contexts emphasizing incremental theories of ability and a variety of experiences for older adults.

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Synthèse de l'étude 2

L'objectif principal de cette étude était de mieux comprendre les corrélats personnels (i.e., ouverture aux expériences et théories implicites de l'habileté) de l'internalisation des stéréotypes et leur relation avec l'activité physique auto-rapportée. Un total de 192 seniors (78 hommes et 114 femmes) âgés de 60 à 93 ans (M = 73.44 ans ; ET = 7.34) ont complété une série de questionnaires mesurant l'ouverture aux expériences, les théories implicites de l'habileté, les stéréotypes liés au vieillissement dans le domaine de l'activité, l'attitude vis-à-vis du vieillissement, la valeur physique perçue, le niveau d'activité physique, ainsi que des variables contrôle, comme la santé perçue et le niveau d'éducation.

Les principaux résultats indiquent que (a) l'ouverture aux expériences et les théories implicites de l'habileté sont associées au niveau d'activité physique, par l'intermédiaire de l'adhésion aux stéréotypes liés au vieillissement dans ce domaine. Ainsi, plus les seniors seraient ouverts aux expériences et adopteraient une théorie

incrémentielle de l'habileté, plus ils adhèreraient à des stéréotypes positifs ; (b) l'adhésion aux stéréotypes est associée au niveau d'activité physique, par l'intermédiaire des perceptions de soi de l'individu (i.e., attitude vis-à-vis de son vieillissement, valeur physique perçue). En d'autres termes, plus le senior adhèrerait à des stéréotypes positifs, plus il aurait des perceptions positives de lui-même, et un niveau d'activité physique élevé. En somme, ces résultats suggèrent que l'adhésion aux stéréotypes serait un facteur important de l'engagement dans une activité physique des seniors.

Cependant, cette étude est une étude transversale corrélationnelle qui, par définition, n'a appréhendé les variables qu'à un moment donné, et ne permet donc pas de démontrer des relations de cause à effet. Les études suivantes tenteront de répondre à ces limites. Par ailleurs, bien que les stéréotypes personnels aient prédit le comportement par l'intermédiaire de leur intériorisation dans les perceptions de soi, les résultats ont également indiqué une relation directe entre l'adhésion et le comportement. Il semble donc que d'autres mécanismes soient à l'œuvre dans cette relation. Notre troisième étude, de nature longitudinale, a eu ainsi pour objet d'examiner si l'adhésion aux stéréotypes liés au vieillissement peut prédire la santé par d'autres voies d'influence que l'intériorisation, notamment en diminuant l'énergie mentale (i.e., vitalité subjective) chez des seniors actifs, illustrant ainsi un effet *d'ego depletion* (Muraven & Baumeister, 2000).

ETUDE 3

An ego depletion account of aging stereotypes' effects on health-related variables[1]

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[1] Cet article a fait l'objet d'une publication :
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Keywords:	Aging stereotypes, Subjective vitality, Ego depletion, Physical activity, Multilevel growth modeling

Abstract

Objectives. This study examined whether stereotypes may predict health outcomes independently from their internalization into the self. Specifically, we tested whether endorsement of negative age stereotypes in the physical activity (PA) domain is related to decreased subjective vitality among active older adults, illustrating ego depletion.

Method. This longitudinal study included 192 retired individuals aged 60 to 92 years who regularly participated in organized PA, and who completed the measures on three occasions (9-month period).

Results. Multilevel growth models tested whether within-person variation in age stereotypes endorsement across waves predicted subjective vitality, after controlling for self-perceptions of aging and relevant covariates. Results showed that (a) within-person increases in endorsement of age stereotypes of self-efficacy (b = 0.17, $p < .01$) were associated with increases in subjective vitality, (b) between-person mean difference in endorsement of age stereotypes of PA benefits (b = 0.21, $p < .05$) positively predicted subjective vitality, and (c) subjective vitality mediated the relationship between endorsement of self-efficacy stereotype and self-rated health.

Discussion. This study confirmed that endorsement of age stereotypes of PA predicted subjective vitality among active older adults. These results suggest that stereotypes may be related to health-related outcomes notably through ego depletion effects.

Keywords: Age stereotypes, subjective vitality, ego depletion, physical activity, multilevel growth modeling

3.1. Introduction

A growing body of research has started to question the assumption that the aging process can be explained exclusively as a physiological process of inevitable decline (Levy, 2009; Rothermund, 2005). This psychosocial approach to aging considers that age stereotypes (i.e., beliefs about older people in general) may also substantially affect health. For example, there is evidence that older individuals who hold positive age stereotypes recover more rapidly from a disability (Levy, Slade, Murphy, & Gill, 2012), and have better memory (Levy, Zonderman, Slade, & Ferrucci, 2012) abilities than those who hold negative age stereotypes (Levy, 2009).

Aging Stereotypes and Health Outcomes: The Stereotype Internalization Approach

To explain these relationships, the stereotype internalization hypothesis proposes that age stereotypes are internalized into *self-perceptions of aging* (SPA) (older adults' beliefs about their own aging), which act as a lens through which aging experiences are interpreted (Levy, 2009). In line with this idea, SPA have been shown to predict health outcomes, with positive SPA being related to better physical functioning (balance and gait speed) (Sargent-Cox, Anstey, & Luszcz, 2012), and increased survival (Sargent-Cox, Anstey, & Luszcz, 2013). According to the internalization hypothesis, SPA predict health outcomes through their influence on adoption of health behaviors (Levy & Myers, 2004): because people with negative SPA consider their functional decline as an inevitable part of the aging process, they are more likely to consider health-related behaviors as useless than people with positive SPA. Therefore, the latter engage in healthy behaviors (e.g., being physically active) more than the former. In line with this hypothesis, there is evidence that

positive SPA are associated with healthy behaviors such as regular engagement in PA (Emile, Chalabaev, Stephan, Corrion, & d'Arripe-Longueville, 2013; Wurm, Tomasik, & Tesch-Römer, 2010). Moreover, SPA have been shown to mediate the relationship between stereotype endorsement and adoption of an active lifestyle (Emile et al., 2013), providing further support to the stereotype internalization hypothesis.

Interestingly, the study of Emile et al. (2013) also revealed a direct relationship between stereotype endorsement and adoption of an active lifestyle, even after controlling for SPA. This study focused on stereotypes in the domain of PA, which is usually associated with beliefs that older adults are too weak to be physically active (Roters, Logan, Meisner, & Baker, 2010). Results indicated that the more older adults endorsed positive age stereotypes in the domain of PA, the more they adopted an active lifestyle, independently of how they perceived their own aging. This suggests that SPA are not the only pathway through which stereotype endorsement may affect older adults' health. The present study explored a complementary pathway, by testing the novel hypothesis that endorsement of age stereotypes may be related to *ego depletion*, a concept issued from the strength model of self-control (Muraven & Baumeister, 2000). The theoretical rationale underlying this hypothesis is described below.

Aging Stereotypes and Health Outcomes: An Ego Depletion Approach

The strength model defines self-control as the mental energy individuals use to effortfully regulate their emotions, thoughts, impulses, or other automatic behavioral responses that interfere with goal-directed behaviors. A major tenet of the model is that engaging in acts of self-control draws from a limited 'reservoir', which, when depleted, results in reduced capacity for further self-regulation, a phenomenon

known as ego depletion (Muraven & Baumeister, 2000). In other words, ego depletion refers to the depletion of energy necessary to regulate one's behaviors. For example, depleted individuals have been found to regulate physical demands more poorly, and to exercise less regularly (Hagger, Wood, Stiff, & Chatzisarantis, 2010).

Relevant here, a few studies suggest that endorsement of stereotypes may affect ego depletion. Drawing on stereotype threat hypothesis that negative self-stereotypes may be stressful, Inzlicht and Kang (2010) showed that females who faced negative gender stereotypes during a math task had difficulties to exert self-control afterwards: they responded more aggressively, ate more unhealthy food, and made more risky decisions. To explain these results, the authors proposed that coping with stereotype threat when performing a math task consumed the mental energy necessary for self-regulation, leaving females with fewer resources to overcome environmental temptations and override impulses. In the same vein, Levy, Hausdorff, Hencke, and Wei (2000) observed that older adults who were exposed to negative age stereotypes demonstrated a heightened cardiovascular response to stress compared with those exposed to positive age stereotypes, suggesting that stereotypes may act as direct stressors. Given that people who endorse negative self-stereotypes are more susceptible to experience stereotype threat than people who do not (Schmader, Johns, & Barquissau, 2004), these results suggest that stereotype endorsement may affect ego depletion.

The Present Research

Based on these results, we examined whether endorsement of age stereotypes in the domain of PA may be related to ego depletion among older adults who are physically active. It was hypothesized that the more individuals would endorse

negative age stereotypes, the lower their energy for self-regulation. More particularly, we reasoned that if individuals believe that older adults in general are too old to exercise, this belief would be in conflict with their goal to stay physically active. In this case, engaging in regular PA would need self-control resources to override their negative stereotype-based beliefs, leading to increased ego depletion. We examined age stereotypes in the PA domain, because stereotypes that are specific to a life domain may affect individuals' functioning in this domain (Kornadt & Rothermund, 2011) more than other-domain stereotypes. Therefore, we reasoned that negative age stereotypes of PA would likely affect the self-control resources used to participate in PA on a regular basis.

Ego depletion was indexed by subjective vitality, defined as the energy that one can harness or regulate for purposive actions (Ryan & Deci, 2008). In line with theoretical assumptions, the meta-analysis of Hagger et al. (2010) showed that subjective fatigue (i.e., fatigue that is consciously felt) may be one explanation for the self-control deficits observed in ego depletion experiments, reflecting the effortful nature of self-control tasks. Past research indicates that subjective vitality, which may be situation-specific, is a valid marker of ego depletion (Muraven, Gagné, & Rosman, 2008; Rouse, Ntoumanis, & Duda, 2013). For example, Muraven et al. (2008) showed that declines in self-control performance after a depleting task were mediated by decreased subjective vitality. These findings suggest that subjective vitality and behavioral assessments of ego depletion tap into the same phenomenon, with subjective vitality having the advantage of being a highly accessible, phenomenologically-based variable (Ryan & Deci, 2008).

In addition, subjective vitality is an important predictor of health outcomes. It

has notably been associated with more resilience to stressors and less susceptibility to illness (Benyamini, Idler, Leventhal, & Leventhal, 2000), better regulation of negative emotions (Rozanski, Blumenthal, Davidson, Saab, & Kubzansky, 2005), and higher mental health (Ryan & Frederick, 1997). Therefore, if endorsement of negative age stereotypes predicts subjective vitality, this would suggest that ego depletion is a pathway through which age stereotypes may affect older adults' health that complements the internalization pathway.

To provide further support to this hypothesis, an additional objective was to examine whether age stereotypes in the PA domain were related to self-rated health, through the mediating role of subjective vitality. We hypothesized that the more individuals would endorse negative age stereotypes, the lower their subjective vitality, which would in turn result in lower perceived health.

Overview of the study

Multilevel models

The hypothesis that endorsement of age stereotypes predicts lower subjective vitality was examined in a longitudinal design. Measures were assessed on three occasions over a 9-month period, among older adults who participated in PA in leisure clubs on a regular basis. This allowed us to examine whether within-person variability in stereotype endorsement across waves predicted subjective vitality. This hypothesis was tested using multilevel models (Raudenbush & Bryk, 2002).

Covariates

Several covariates were included in this study. First, SPA were taken into account, as the study aimed at examining a pathway of stereotype influence that

complements the stereotype internalization approach. As such, we investigated whether stereotype endorsement may be ego depleting independently of how older adults have internalized stereotypes into perceptions of their own aging. SPA were indexed by participants' attitude toward their own aging (e.g., "Things keep getting worse as I get older"). Self-perceptions related to the physical domain were also measured, in order to rule out the possibility that the stereotype measure would not tap into a domain not being assessed by the SPA measure. These self-perceptions were assessed by physical self-worth (i.e., general feelings of happiness, satisfaction, pride, respect, and confidence in the physical self).

In addition, we controlled for individual differences in motivation for PA. We reasoned that although engaging in health-related behaviors on a regular basis may require self-control resources, this is not systematically the case. Based on self-determination theory (Deci & Ryan, 2000), past research indicates that engaging in self-control behaviors for autonomous reasons (free choice) is less depleting than exerting self-control for controlled reasons (external or internal pressure) (Muraven et al., 2008). Therefore, we measured older adults' motivations for PA (autonomous *vs.* controlled motivations) and examined whether stereotype endorsement affects subjective vitality independently of these motivations.

Other covariates included self-reported level of PA (leisure and daily activities), self-rated health, and perceived loneliness. These variables were chosen because past research has shown that they are related to PA stereotype endorsement (Chalabaev et al., 2013), and health-related variables (Levy, 2009) in older adults.

3.2. Method

Participants

192 retired individuals (24 men and 168 women) aged from 60 to 92 years (M_{years} = 73.22*; SD* = 7.53*),* and residing in the south of France, participated in this study on a voluntary basis. Participants met the following criteria: (a) participating in at least one session of organized PA per week (based on the timesheets completed by PA instructors at each session), and (b) living independently in the community. Among the initial 362 contacted participants, 72 were not included because they did not meet these criteria. Moreover, we excluded from the analyses 98 participants who participated in the study on one occasion only. Indeed, as our main goal was to examine the relationship between stereotype endorsement and ego depletion among active older adults, we wanted to ascertain that participants were regular PA participants. Concerning education level, 71.1% of participants had completed high school. The study complied with APA ethical standards.

Procedure

Participants were contacted through a leisure club for older adults, comprising roughly 1400 members. The membership fee costs ten euros per year, making this club accessible to individuals with various income levels. Eligibility requirements include: (a) living in the southeast region of France, (b) being retired, (c) being aged 49 years and older, and (d) presenting a medical certificate attesting that the individual was free from severe functional, mental or cognitive impairment. They were informed about the study on site, during their PA lessons. Written informed consent was obtained from all participants. After their PA lesson at the leisure club, participants were asked to fill out individually a questionnaire that included the

variables of interest. The average time of completion was 15 minutes. Measures were assessed on three occasions over a 9-month period, with an interval of 4 to 5 months between each occasion.

Measures

Subjective vitality. Subjective vitality was measured by the *Subjective Vitality Scale* (Ryan & Frederick, 1997), which includes five items (e.g., "I feel alive and vital"). Participants responded on a 7-item Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). The scale presented good reliability (α = .90).

Age stereotypes in the PA domain. Endorsement of age stereotypes was assessed using the *Aging Stereotypes and Exercise Scale* (Chalabaev et al., 2013). This questionnaire consists of 12 items divided into three subscales: (a) four items measure stereotypes about older adults' self-efficacy to participate in PA on a regular basis (e.g., "older adults are convinced that they are capable of being physically active"), (b) four items measure stereotypes about positive outcomes (i.e., benefits) of PA for older adults (e.g., "PA raises older adults' spirits"), and (c) four items measure stereotypes about negative outcomes (i.e., risks) of PA for older adults (e.g., "the physical capacities of older adults are too diminished for being physically active"). Participants responded on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*), such that lower scores indicate lower beliefs in older adults' self-efficacy, positive outcomes of PA, and negative outcomes of PA. Each subscale presented good reliability ($\alpha_{self\text{-}efficacy}$ = .78, $\alpha_{benefits}$ = .80, α_{risks} = .83).

Covariates.

Self-perceptions of aging. SPA were measured by a French version (Allard, Allaire, Leclerc, & Langlois, 1991) of the *Attitude Toward Own Aging* scale (Liang & Bollen, 1983), which consists of five items (e.g., "Things keep getting worse as I get older"). Participants responded on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). This scale has been used to assess self-perceptions of aging (Levy et al., 2002; Sargent-Cox et al., 2012). This scale presented good reliability ($\alpha = .78$).

Self-determined motivation. Motivation for PA was measured with the French version (Gourlan, Sarrazin, & Trouilloud, 2013) of the *Behavioural Regulation in Exercise Questionnaire* (BREQ-2) of Markland and Tobin (2004). This questionnaire consists of 15 items assessing four types of regulations: (a) external (4 items, e.g., "I exercise because other people say I should"), (b) introjected (3 items, e.g., "I feel guilty when I don't exercise"), (c) identified (3 items, e.g., "I value the benefits of exercise"), and (d) intrinsic (4 items, e.g., "I exercise because it's fun"). Participants responded on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). Finally, in agreement with previous studies on self-determination (Silva et al., 2011), the intrinsic motivation and identified regulation subscales were averaged to form a score of autonomous motivation, whereas a score of controlled motivation was created by averaging the responses provided to the introjected regulation and external regulation subscales. Each subscale presented good reliability ($\alpha_{\text{autonomous}} = .82$, $\alpha_{\text{controlled}} = .79$).

Physical self-worth. Physical self-worth was measured using the corresponding subscale of the *Physical Self Inventory* (PSI-25), the French version of

the *Physical Self-Perception Profile* (PSPP) of Fox and Corbin (1989) (Ninot, Delignières, & Fortes, 2000). It consists of five items (e.g., "Overall, I am satisfied with my physical capacities"). Participants answered on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). The internal consistency of the subscale was satisfactory (α = .87).

Level of general PA. Level of PA was measured with the *Dijon Physical Activity Score* of Robert et al. (2004). This 9-item questionnaire was specifically developed to assess PA in a population of healthy, elderly subjects. The scale includes: (a) an overall appraisal of one's PA ("Do you consider yourself to be physically: from (1) very active and athletic, to (4) completely sedentary?"); (b) two items on everyday activities ("On a weekly basis, your everyday activities take you: from (1) more than 10 hours, to (5) no time spent"); (c) five items on sport and leisure activities (e.g., "For how many months of the year do you engage in these activities (sport or leisure)?"); and (d) one item on rest ("On a daily basis, you rest (sleep, nap or wakeful rest): from (1) less than 12 hours, to (4) more than 20 hours"). Then the scores on each item are summed up, and this total score indicates participant's level of physical activity (individuals who score below 18 (out of 30 points) being considered as sedentary). This measure has been shown to be reproducible and to be a valid measure of PA. The score notably correlates with maximal oxygen consumption and maximal power attained during a stress test in older adults (Robert et al., 2004), and with energy expenditure measured using an accelerometer in coronary artery disease patients (Guiraud, Granger, Bousquet, & Gremeaux, 2012).

Perceived loneliness. Perceived loneliness was measured by the following item "I feel lonely" (*Philadelphia Geriatric Center Morale Scale*; Lawton, 1975).

Participants answered on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*).

Self-rated health. Self-rated health was measured by the following item "In general, how would you rate your current health status". Participants answered on a 6-point Likert scale ranging from 1 (*very bad*) to 6 (*very good*) (Benyamini, Leventhal, & Leventhal, 2003).

Data Analysis

Multilevel models tested whether within-person variation in age stereotypes endorsement across waves predicted subjective vitality, after controlling for relevant covariates. Multilevel models extend multiple regressions to data that are hierarchically structured (Singer & Willett, 2003). Given that we had several observations for each individual, repeated measurements (level 1 units of analysis) were nested within individuals (level 2 units of analysis). This method has several advantages over ordinary least squares regression. Multilevel models are a flexible approach that can be applied to evaluate inter-individual differences in intra-individual changes over time. That is, these models separate inter-individual variance from intra-individual variance, so that each participant has his or her own curve (Raudenbush & Bryk, 2002). Indeed, traditional regression models are based on the assumption that all observations are independent, which may not be the case with nested data. In addition, multilevel models do not require equal numbers of responses from each participant, which is usually the case in longitudinal designs (for use in aging research, see Birditt, Antonucci, & Tighe, 2012). By taking into account the hierarchical structure of the data, multilevel models provide unbiased estimates of the parameters (Singer & Willett, 2003).

The hypothesis that endorsement of age stereotypes predicts subjective vitality was thus tested in several steps. First, unconditional models (i.e., with no predictor) were estimated for each variable. Intraclass correlations were calculated from these models to estimate the amount of variance at the between and within-individual levels, which allowed us to determine whether conducting multilevel models was relevant or not. Next, all explanatory variables were added in the conditional growth model, along with time (the baseline time point, wave 1, was given a value of 0 on the timescale). This model explored whether within-person variation in age stereotypes endorsement predicted subjective vitality, after controlling for covariates (SPA, self-determined motivation for PA, physical self-worth, perceived loneliness, self-rated health, level of general PA).

Preliminary models included time × predictor interaction terms to test whether the relationships changed significantly over the course of the study. However, as these interactions were not significant, they were not included in the final model. Similarly, inclusion of the random effects of the linear slope and of the covariance slope-intercept did not improve fit of the model, and were therefore not included in the final model.

We therefore tested a two-level random intercept model that led to the following Level 1 model:

$$\text{Vitality}_{it} = \beta_{0i} + \beta_1\ \text{time}_{it} + \beta_2\ \text{self-efficacy stereotype}_{it} + \beta_3\ \text{PA benefits stereotype}_{it} + \beta_4\ \text{PA risks stereotype}_{it} + \beta_5\ \text{SPA}_{it} + \beta_6\ \text{autonomous motivation}_{it} + \beta_7\ \text{controlled motivation}_{it} + \beta_8\ \text{physical self-worth}_{it} + \beta_9\ \text{perceived loneliness}_{it} + \beta_{10}\ \text{self-rated health}_{it} + \beta_{11}\ \text{level of general PA}_{it} + e_{it.}$$

In this equation, person *i*'s score of vitality at time *t* is a sum of his/her rating

intercept (β_{0i}), linear change over time (β_1), the regression coefficients associated with explanatory variables and covariates (β_2 to β_{11}), and a residual term e_{it}.

The present study included time-varying (Level 1) and time-invariant (Level 2) predictors. Time-varying predictors were centered on each individual's unique mean over time (i.e., group mean centering), which enabled for a pure estimation of the intra-individual effects (Enders & Tofighi, 2007). Time-invariant predictors were centered on the sample mean (i.e., grand mean centering). We added these mean scores to ensure that our estimates of within-person change at level 1 were not confounded with between-person differences (Raudenbush & Bryk, 2002). This led to the following Level 2 model:

$\beta_{0i} = \gamma_0 + \gamma_1$ mean self-efficacy stereotype$_i$ + γ_2 mean PA benefits stereotype$_i$ + γ_3 mean PA risks stereotype$_i$ + γ_4 mean SPA$_i$ + γ_5 mean autonomous motivation$_i$ + γ_6 mean controlled motivation$_i$ + γ_7 mean physical self-worth$_i$ + γ_8 mean perceived loneliness$_i$ + γ_9 mean self-rated health$_i$ + γ_{10} mean level of general PA$_i$ + u_{0i}.

This equation indicates that β_{0i} is equal to a constant (γ_0), the regression coefficients associated with time-invariant explanatory variables and covariates (γ_1 to γ_{10}), and a residual term u_{0i}. We did not include predictors of the slopes because the time x predictor interaction was not significant.

The fit of the model was tested using a chi-square test of the differences in -2 log likelihood values (LLV) between this model and the unconditional growth model (with time as the only predictor), with degrees of freedom equal to the difference between each model's total number of estimated parameters. The difference in -2 LLV may be useful to assess whether adding fixed effects to a model increases its overall fit to the data (Singer & Willett, 2003; see for example Trouilloud, Sarrazin,

Bressoux, & Bois, 2006). Finally, we calculated pseudo $R1^2$ (within-person level) and $R2^2$ (between-person level) values to estimate the proportion of variance accounted for by the predictors from the unconditional growth model to the conditional model (Singer & Willett, 2003). These values are an estimate of effect size, similar to the R^2 value in traditional ordinary least squares regression analyses (Hox, 2002).

3.3. Results

Means, standard deviations, Cronbach's alpha coefficients for all variables at each wave are presented in Table 1 along with their intraclass correlation (ICC). Correlations are reported in Table 2.

On average, at time 1, participants reported high endorsement of self-efficacy stereotype (M = 5.66), benefits of PA stereotype (M = 6.31), and low endorsement of risks of PA stereotype (M = 2.49). Moreover, they reported high autonomous motivation (M = 6.48) and low controlled motivation (M = 2.74). Finally, they presented high SPA (M = 5.03), physical self-worth (M = 4.85), self-rated health (M = 4.65), subjective vitality (M = 4.96), and perceived loneliness (M = 5.32).

Intraclass correlations showed that a significant amount of variance was located at the between-individual level for all variables, including subjective vitality (57%), stereotype endorsement (57% to 65%), SPA (61%), motivations for physical activity (59% to 69%), physical self-worth (75%), perceived loneliness (80%), self-rated health (68%), and level of general PA (57%). This indicates several sources of variation (between and within-individuals) in our variables, justifying our rationale for using multilevel modeling (Hox, 2002).

Table 1.

Means, Standard Deviations, Cronbach's Alpha Coefficients, and Intraclass Correlation Coefficients of All Variables

	Time 1			Time 2			Time 3			
Variable	M	SD	alpha	M	SD	alpha	M	SD	alpha	ICC
Subjective vitality	4.96	1.15	.88	5.00	1.14	.83	5.09	1.23	.86	.57
Self-efficacy stereotype	5.66	0.99	.78	5.51	1.03	.85	5.44	0.96	.79	.65
Benefits of physical activity stereotype	6.31	0.68	.80	6.23	0.77	.91	6.17	0.85	.85	.58
Risks of physical activity stereotype	2.49	1.17	.83	2.31	1.02	.78	2.36	1.22	.75	.57
Self-perceptions of aging	5.03	1.29	.90	5.00	1.24	.84	5.08	1.24	.76	.61
Autonomous motivation	6.48	0.65	.82	6.43	0.65	.77	6.33	0.75	.79	.59
Controlled motivation	2.74	1.62	.79	2.84	1.27	.82	2.37	1.16	.75	.69
Physical self-worth	4.85	0.98	.78	4.46	0.63	.86	4.67	0.82	.76	.75
Perceived loneliness	5.32	1.07	.87	5.15	1.07	.89	5.03	1.29	.87	.80
Self-rated health	4.65	.071	-	4.61	0.58	-	4.59	0.82	-	.68
Level of general physical activity	18.98	2.91	-	19.17	2.46	-	18.77	2.79	-	.57

Table 2.

Descriptive Statistics and Matrix of Pearson Correlation Coefficients Between the Variables at Time 1 (N = 192)

	1	2	3	4	5	6	7	8	9	10	11
1. Subjective vitality	-										
2. Self-efficacy stereotype	.37**	-									
3. Benefits of physical activity stereotype	.34**	.68**	-								
4. Risks of physical activity stereotype	-.04	-.21**	-.21**	-							
5. Self-perceptions of aging	.65**	.31**	.27**	-.17**	-						
6. Autonomous motivation	.36**	.40**	.54**	-.05	.28**	-					
7. Controlled motivation	.01	.02	.07	.37*	-.09	.21**	-				
8. Physical self-worth	.64**	.42**	.35**	-.07	.62**	.43**	.05	-			
9. Perceived loneliness	-.27**	-.09	-.03	.03	-.36**	-.02	.10	-.36**	-		
10. Self-rated health	.48**	.30**	.28**	-.07	.41**	.28**	-.05	.41**	-.16*	-	
11. Level of general physical activity	.29**	.22**	.29**	-.14*	.25**	.27**	-.01	.25**	-.11*	.20**	-

Note. * $p < .05$, ** $p < .01$.

We next tested whether stereotype endorsement predicted subjective vitality, after controlling for covariates (Table 3). First, this model provided a better fit to the data, the reduction of the deviance of this model, compared with the unconditional growth model, being significant ($\mathbf{\Delta}$ = 161.1; *df* = 20; $p < .001$). At level 1, increases in endorsement of age stereotypes of self-efficacy (b = 0.17, $p < .01$) were associated with increases in subjective vitality ($ß_2$). Some covariates were also significant predictors of subjective vitality, and notably SPA (b = 0.17, $p < .01$) ($ß_5$), autonomous motivation (b = 0.17, $p < .05$) ($ß_6$), physical self-worth (b = 0.44, $p < .001$) ($ß_8$), perceived loneliness (b = -0.08, $p < .05$) ($ß_9$), and self-rated health (b = 0.22, $p < .01$) ($ß_{10}$). All of these predictors accounted for 38.2% of the within-person variance in subjective vitality. At level 2, results revealed that between-person mean differences in endorsement of age stereotypes of PA benefits (b = 0.21, $p < .05$) positively predicted subjective vitality (γ_2), along with SPA (b = 0.39, $p < .001$) (γ_4), physical self-worth (b = 0.45, $p < .001$) (γ_7), perceived loneliness (b = -0.07, $p < .05$) (γ_8), and self-rated health (b = 0.44, $p < .001$) (γ_9). This model accounted for 38.2% of the within-person and 37.5% of the between-person variance in subjective vitality.

In order to examine whether stereotypes predicted health beyond subjective vitality, we tested whether age stereotypes affected self-rated health through the mediating role of subjective vitality. To do so, we added subjective vitality to the multilevel model (at both Level 1 and Level 2), with self-rated health as the outcome. This allowed testing whether the mediator (vitality) predicted self-rated health, after controlling for the predictor (stereotypes) and relevant covariates. Results showed that subjective vitality positively predicted self-rated health at the within-individual level (b = .21, $p < .001$), along with stereotypes of self-efficacy (b = .10, $p < .05$). We then tested the significance of the indirect effect of age stereotypes on self-rated

Table 3.

Multilevel growth model predicting subjective vitality of active older adults over a period of nine months

Parameters	b	SE
Fixed effects		
Intercept	-1.92	0.76*
Time	0.09	0.03**
Within-person level		
Self-efficacy stereotype	0.17	0.05**
Benefits of physical activity stereotype	-0.01	0.06
Risks of physical activity stereotype	-0.04	0.04
Self-perceptions of aging	0.17	0.06**
Autonomous motivation	0.17	0.09*
Controlled motivation	0.02	0.04
Physical self-worth	0.44	0.06***
Perceived loneliness	-0.08	0.03*
Self-rated health	0.22	0.07**
Level of general PA	0.01	0.02

Between-person level		
Self-efficacy stereotype	-0.02	0.07
Benefits of physical activity stereotype	0.21	0.11*
Risks of physical activity stereotype	0.01	0.02
Self-perceptions of aging	0.39	0.10***
Autonomous motivation	-0.09	0.12
Controlled motivation	0.03	0.05
Physical self-worth	0.45	0.07***
Perceived loneliness	-0.07	0.03*
Self-rated health	0.44	0.10***
Level of general PA	0.01	0.02
Random effects		
Level 1 (within-person)	0.26	0.02***
Level 2 (between-person)	0.33	0.04***
R_1^2	.382	
R_2^2	.375	
-2 Log L	1180.0	

Note. SE: Standard Error. R_1^2 and R_2^2 values indicate the proportional amount of variance explained by the variables added in the final growth model as compared to the unconditional growth model at the within and between-person level, respectively. A preliminary model including interactions between endorsement of stereotypes and motivations was tested. These interactions were not significant and therefore removed. *p<.05; **p <.01; ***p < .001.

health using the distribution of products test (MacKinnon, Lockwood, Hoffman, & Sheets, 2002). Results showed that the indirect effect was significant (P = 11.22, $p < .001$). In other words, within-individual endorsement of self-efficacy stereotypes predicted self-rated health through its indirect effect on vitality.

3.4. Discussion

In line with a psychosocial approach to aging, the study examined whether stereotypes may predict health outcomes independently from their internalization into the self (Levy, 2009). Based on the strength model of self-control (Muraven & Baumeister, 2000), we hypothesized that endorsement of negative age stereotypes may be related to depletion of resources for self-regulation as indexed by subjective vitality. Results corroborated this hypothesis, showing that the less participants believed in the benefits of PA and in older adults' self-efficacy to stay physically active, the less they experienced vitality, over a 9-month period. Importantly, these results were observed after controlling for SPA and a number of potential correlates of subjective vitality (i.e., self-rated health, level of PA, self-determined motivation for PA, physical self-worth, and perceived loneliness). Results also revealed that subjective vitality acted as a mediating variable between endorsement of self-efficacy stereotype and self-rated health.

These findings open new avenues of research by suggesting that age stereotypes may affect health through multiple pathways, and not only through their internalization into the self. Although the internalization hypothesis is important in predicting the aging process, our results suggest that other mechanisms may be involved. This idea is reinforced by the fact that the findings were observed among

active older adults, in other words, among individuals who are the least likely to have internalized negative aging stereotypes in the PA domain.

If age stereotypes may affect subjective vitality and health independently from their internalization into SPA, what are the mechanisms involved? Stereotype threat research could help explain the results. There is indeed evidence that coping with threatening negative stereotypes may consume the mental energy necessary for self-regulation (Inzlicht & Kang, 2010). Moreover, people who endorse stereotypes may be more susceptible to experience stereotype threat (Schmader et al., 2004). Based on these results, it is possible that endorsement of negative age stereotypes conflicted with older adults' goal to stay physically active, which required self-control resources to override stereotype-based beliefs, leading in turn to decreased subjective vitality. As we used a correlational design, it is difficult to establish causality links from the observed relationships: stereotype endorsement may have impacted vitality, but vitality may have also affected stereotype endorsement by generating a general "optimistic outlook". A recent study tested the direction of the SPA-functional health relationship over a 16-year period, and found that the best fitting model was that which allowed SPA to predict change in functional health (Sargent-Cox et al., 2012). Given that SPA index stereotype internalization, one may wonder whether the same results could be observed with regard to the stereotype endorsement-vitality relationship. However, given that we did not measure the same constructs as in Sargent-Cox et al.'s (2012) study, it is not possible to draw conclusions. The next step consists in conducting experiments to better ascertain the direction of this relationship, as well as the mechanisms underlying it, and we hope that other researchers will join us to start investigating this stereotype-related ego depletion hypothesis. Although we cannot infer causality relationships, one strength of this

correlational study was to use a rigorous methodology for validity purposes, by using a longitudinal design including relevant covariates, and multilevel modeling.

In addition, the predominance of women is specific to our sample. Given that women may have to face negative sex stereotypes (e.g., women have lower physical and motor abilities than men) in the domain of PA (Chalabaev, Sarrazin, Fontayne, Boiché, & Clément-Guillotin, 2013), it would be interesting to examine whether stereotype endorsement affects subjective vitality similarly among men. Another potential moderator refers to older adults' goal to stay physically active. Although fulfilling such goal may require self-control resources, this may depend on the reasons of engagement. Engaging in self-control behaviors for autonomous reasons may be less depleting than engaging for controlled reasons (Muraven et al., 2008). As our sample was characterized by a high degree of autonomous reasons to engage in PA, it would be interesting to compare it with a sample of older adults who engage in PA for controlled reasons. We may expect the latter to exhibit higher levels of ego depletion.

Beyond the question of the mechanisms that underlie stereotype effects, the present study has implications with regard to health more generally. Indeed, subjective vitality is an important predictor of health outcomes, as it is associated with more resilience, less susceptibility to illness (Benyamini et al., 2000), and higher mental health (Ryan & Frederick, 1997). Our results were in line with this literature, as they showed significant correlations between vitality and self-rated health. It is therefore crucial to better understand the health consequences of aging stereotypes endorsement through subjective vitality on the long term. Moreover, future research should examine whether decreased vitality is associated with self-control failures,

which may be reflected in decreased adherence to an exercise program.

Finally, results indicated that aging stereotypes differentially affected subjective vitality depending on their specific content. For example, time-varying endorsement of self-efficacy stereotypes positively predicted subjective vitality, but not time-varying endorsement of outcomes stereotypes. These results may be due to different relations between these stereotypes and intention to be physically active. Indeed, it seems that self-efficacy is a better correlate of older adults' PA intention than outcomes expectancies (Caudroit, Stephan, & Le Scanff, 2011). It is therefore possible that the less participants believed in older adults' self-efficacy to be physically active, the less they intended to continue being physically active, increasing in turn ego depletion. Future research should be conducted to better understand the different implications of specific stereotypes.

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Synthèse de l'étude 3

L'objectif de cette étude longitudinale était d'examiner si les stéréotypes prédisent des comportements de santé indépendamment de leur internalisation dans le Soi. Plus particulièrement, nous avons vérifié si l'adhésion aux stéréotypes négatifs liés au vieillissement dans le domaine de l'activité physique était reliée à une diminution de la vitalité subjective chez des seniors actifs, illustrés par *l'ego depletion*. Un total de 192 seniors retraités (24 hommes et 168 femmes ; M = 73.22 ans, ET = 7.53), pratiquant une ou plusieurs activité(s) physique(s) en milieu associatif, ont répondu volontairement à une enquête par questionnaire, à deux ou trois reprises sur une période de neuf mois. Des modèles multi-niveaux ont permis de tester si les variations intra et inter-individuelles de l'adhésion aux stéréotypes liés au vieillissement prédisaient la vitalité subjective, en contrôlant les perceptions de soi et d'autres covariables. Les résultats ont montré (a) qu'une diminution de la variation intra-individuelle de l'adhésion aux stéréotypes relatifs à l'auto-efficacité (b = 0.17, p < .01) étaient associée à une diminution de la vitalité subjective, et (b) les variations inter-individuelles de l'adhésion aux stéréotypes relatifs aux bénéfices perçus de

l'activité physique (b = 0.21, $p < .05$) prédisaient positivement la vitalité subjective. Cette étude enrichit la littérature existante en montrant que l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique peut prédire la vitalité subjective des seniors. Ces résultats suggèrent que les stéréotypes seraient reliés à des prédicteurs de santé par le biais d'autres processus que ceux reliés à l'internalisation des stéréotypes, notamment par un effet d'*ego depletion*.

Des analyses complémentaires ont été réalisées afin d'examiner si les stéréotypes du vieillissement liés à l'activité physique pouvaient aussi constituer un frein à un engagement durable et être, à terme, une source d'abandon chez des seniors actifs. A notre connaissance, peu d'études s'appuient sur des devis longitudinaux pour examiner ces relations. Nous avons donc testé la relation entre l'adhésion aux stéréotypes liés au vieillissement et le niveau d'activité physique de seniors actifs sur une période de neuf mois. De plus, l'adhésion aux stéréotypes relatifs aux risques perçus de l'activité physique prédisait négativement (b = -0.29, p =.05) le niveau d'activité physique, en contrôlant la santé perçue et la valeur physique perçue. Ces résultats ont donc montré une relation entre le degré d'adhésion aux stéréotypes relatifs aux risques perçus de l'activité physique et le niveau d'activité physique déclaré de seniors actifs sur une période de neuf mois, en contrôlant des prédicteurs de l'activité physique tels que la santé perçue et la valeur physique perçue. Plus précisément, la variation intra-individuelle de l'adhésion à ces stéréotypes prédisait négativement la variation intra-individuelle du niveau d'activité physique. En d'autres termes, plus les seniors percevraient des risques à avoir une pratique physique, plus ils diminueraient leur niveau d'activité physique déclaré au cours du temps.

Afin de compléter ces résultats et ceux de l'étude 2, et dépasser les limites des données auto-rapportées (e.g., évaluation subjective de l'activité physique), nous avons souhaité dans la suite de ce travail doctoral mettre en place une étude expérimentale et une étude interventionnelle manipulant nos variables d'intérêt afin d'observer leurs effets sur des mesures comportementales en lien avec l'activité physique. Ainsi, l'objet de la quatrième étude était d'examiner dans quel contexte (i.e., stéréotypique *vs.* contre-stéréotypique) les théories implicites de l'habileté seraient le plus efficaces sur le fonctionnement physique des seniors. Cette étude se base sur le modèle socio-cognitif de Dweck et al. (Dweck, 1986; Dweck & Legett, 1988), qui stipule que les théories de l'entité (i.e., caractère non malléable) seraient associées à une diminution de la performance (Ommundsen, 2001), alors que les théories incrémentielles (i.e., caractère malléable) seraient liées à une augmentation de la performance (Da Fonseca et al., 2008).

ETUDE 4

Effects of implicit theories of ability on handgrip strength in older adults: Does stereotypic context matter?[1]

[1] Cet article fera l'objet d'une soumission pour publication :
Emile, M., Chalabaev, A., Colson, S. S., Falzon, C., & d'Arripe-Longueville, F. Effects of Implicit Theories of Ability on Handgrip Strength in Older Adults: Does Stereotypic Context Matter?

Abstract

This study examined whether aging counter-stereotypes moderate the effects of implicit theories of ability on handgrip strength in older adults. Sixty-five retired older adults (10 men and 55 women) from 61 to 89 years old (M_{age} = 74.5 years; *SD* = 6.5) performed maximum voluntary contractions (MVC) during a handgrip task in a design manipulating implicit theories of ability and aging stereotypes. Incremental mind-set participants had: (a) higher scores of peak MVC and rate of force development (RFD) in a counter-stereotypic context as compared to their initial scores and, (b) higher RFD scores than entity mind-set participants in the counter-stereotypic context. These findings suggest that the positive effects of incremental theory on performance depend on the stereotypic context in which evaluations take place.

Key words: elderly, incremental mind-set, counter-stereotype threat, rate of force development, maximum voluntary contraction.

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4.1. Introduction

Muscle wasting is associated with detrimental outcomes in the elderly (Fisher, 2004). Several studies indicated that handgrip strength was a predictor of functional, psychological and social health in this population (Taekema, Gussekloo, Maier, Westendorp, & de Craen, 2010). Consequently, low handgrip strength is considered as an accurate indicator of frailty in older adults (Gale, Martyn, Cooper, Sayer, 2007). Handgrip strength depends on age, sex and ethnicity, as well as on height, body mass index (BMI), nutritional status and physical exercise (e.g., Dodds, Kuh, Aihie Sayer & Cooper, 2013; Norman, Stobäus, Gonzales, Schulzke, & Pirlich, 2011; Stenholm et al., 2012). However, there is a pressing need to identify the psychosocial factors that might influence handgrip strength in older adults.

Among the different existing models of change behavior, this research focused on the social-cognitive model of Dweck and colleagues (Dweck, 1986; Dweck & Legett, 1988). According to this model, the way of conceiving ability in a task or domain is an important predictor of behavior. Two implicit theories of ability have been identified: people who adopt an entity theory consider ability as stable and immutable, whereas those who endorse an incremental theory perceive ability as amenable to change. Studies have consistently shown that incremental theory are associated with positive outcomes, including increased performance (e.g., Sarrazin, Biddle, Famose, Cury, Fox, & Durand, 1996) and intrinsic motivation in the motor domain (e.g., Cury, Elliot, Da Fonseca, & Moller, 2006; Wang & Biddle, 2003). Indeed, an incremental view of ability is associated with the belief of effort efficacy and cognitive self-regulation, and has been found to foster a task or learning goal orientation in which individuals focus on improvement, learning and developing new

skills (Dweck, 1999; Ommundsen, Roberts, Lemyre, & Miller, 2005). However, little is known about the boundary conditions of these effects.

The present research investigated in which contexts implicit theories may lead to different outcomes. More particularly, we examined this question in the context of aging stereotypes related to muscle strength. Indeed, several researches suggested that aging stereotypes may have adverse effects on a variety of physical outcomes such as the cardiovascular response to stress (Levy & Leifheit-Limson, 2009) and the physical activity level (Emile, Chalabaev, Stephan, Corrion, & d'Arripe-Longueville, 2013). Strength performance tasks have been shown to be susceptible to stereotypes effects (Chalabaev, Brisswalter, Radel, Coombes, Easthope, & Clément-Guillotin, 2013). While prior research has demonstrated the value of incremental theory of ability to boost the performance of stigmatized group members in academic domains (Aronson, Fried, & Good, 2002; Good, Aronson, & Inzlicht, 2003), the way by which stereotypic information could moderate the influence of implicit theories of ability on performance has not yet been explored. Based on the assumption that entity theorists are particularly prone to engage in processes similar than those involved in stereotyping (Aronson et al., 2002; Levy, Stroessner, & Dweck, 1998), and that counter stereotypic information improves cognitive flexibility (De Dreu, Baas, & Nijstad, 2008), it can be hypothesized that counter-stereotypic information improve incremental theory effects, and alleviate entity theory effects. The objective of this study was thus to test whether implicit theories' effects on a handgrip task in older adults are moderated by the stereotypic context (i.e., stereotypic or counter-stereotypic) in which the test takes place.

Implicit theories of ability and physical capacities

According to Dweck's social-cognitive model (Dweck, 1986; Dweck & Leggett, 1988), how people conceive ability has important implications on behavioral, cognitive, and affective variables. Studies in sport psychology conducted with children and young adults have consistently reported that entity theory are associated with maladaptive templates like decreased performance (Ommundsen, 2001) and intrinsic motivation (Biddle, Wang, Chatzisarantis, & Spray, 2003), and increased anxiety (Ommundsen, 2001) and ability attributions for failure (Spray, Wang, Biddle, & Chatzisarantis & Warburton, 2006), whereas incremental theory are related to positive outcomes like increased performance (Da Fonseca et al., 2008) and intrinsic motivation (Cury et al., 2006; Wang & Biddle, 2003).

Research in older adults is scarcer. A recent study of Emile et al. (2013) showed that implicit theories of ability were related to the level of physical activity in older adults. Interestingly, this relationship was mediated by endorsement of aging stereotypes. More particularly, incremental theory positively predicted the level of physical activity through endorsement of stereotypes relative to benefits of physical activity, whereas entity theory negatively predicted physical activity through endorsement of stereotypes relative to risks of physical activity. However, stereotypes in this study were studied as a personal endorsement variable and not as a contextual variable such as stereotype threat.

Implicit theories and stereotype threat

Previous research suggests that implicit theories of ability may be related to stereotype threat. According to Steele and Aronson (1995), stereotype threat refers to

being at risk of confirming, as self-characteristic, a negative stereotype about one's group. When they are confronted with a difficult task, individuals in a stereotype threat situation were similar to entity theorists because they face the same perception of fixedness of ability (Aronson et al., 2002; Dweck, 1999; Levy et al., 1998). As stereotypes imply fixed and limited abilities based on group membership, stereotype threat might temporarily induce an entity theory mind-set (Aronson et al., 2002). Therefore, helping individuals to adopt an incremental theory should alleviate stereotype threat effects. Past studies have provided support to this hypothesis, by showing that activating incremental theory of intelligence reduced stereotype threat effects on cognitive performance (Aronson et al., 2002; Bagès & Martinot, 2011; Good et al., 2003). Furthermore, counter-stereotypic information has also been shown to reduce stereotype threat and enhance performance. Specifically, being encouraged to think counter-stereotypically not only decreases stereotyping, but could also lead to the generation of more creative ideas and enhance cognitive flexibility (De Dreu et al., 2008; Goclowska & Crisp, 2013; Goclowska, Crisp, & Labuschagne, 2012). These results suggest that counter-stereotypic information may have similar influence on implicit theory mind-set.

The present research

While previous results suggest that stereotype threat may be overcome by adopting an incremental theory mind-set, inversely we can wonder if implicit theory mind-set could be moderated by stereotypic information. The purpose of this study was to examine this question in the context of older adults' performance on a handgrip task. We hypothesized that older adults assigned to an incremental mind-set condition would obtain higher scores for muscle strength after exposure to an

aging counter-stereotype, whereas older adults in an entity mind-set condition would show lower scores despite the aging counter-stereotype.

Stereotypes were manipulated by telling participants that the test examined aging effects on muscle strength characteristics developed during a handgrip task (i.e., stereotype threat context), and was constructed to control for biases that might be associated with age (i.e., counter-stereotypic context). As handgrip strength impairment in the elderly has been associated with weakened health status, functional disability and cognitive decline in many prospective studies (Raji, Kuo, Snih, Markides, Peek, & Ottenbacher, 2005; Taekema et al., 2010) and according to the European recommendations (Cruz-Jentoft et al., 2010), a handgrip task was chosen for this study purpose.

4.2. Method

Participants

Participants of senior sports clubs in the southeast of France were contacted through newsletters, emails, or direct contact. Individuals were eligible to participate if they met the following criteria: (a) 60 years or older, (b) physically active, (c) medical certificate allowing the practice of adapted physical activities, and (d) independent living in the community. The exclusion criteria comprised any bone, muscle or tendon trauma of the upper limbs (e.g., from shoulder to fingers). From a total of 78 older adults assessed for eligibility, 13 individuals were excluded because of health problems (i.e., osteoarthritis, carpal tunnel pain, shoulder or wrist tendinitis). The final sample was composed of 65 individuals (i.e., 10 men and 55 women) from 61 to 89 years old (M_{age} = 74.5 years; SD = 6.5) who met the criteria.

Among them, 43.1% had not completed high school, and 56.9% had completed high school. All participants were informed of the study purpose and risks, and gave informed written consent prior to enrolment. The protocol was institutionally approved and conformed to the Declaration of Helsinki.

Procedure

The older adults were randomly assigned to one of two groups following a randomization procedure by computerized random numbers: (a) the entity condition (*N*= 33) or, (b) the incremental condition (*N*= 32). Participants were invited into a private room and informed that the study purpose was to investigate the factors of muscle strength during a handgrip task and that their performance would be measured twice. The experimenter, who was blinded to the group allocation, then asked them to read a document providing handgrip task instructions, and they familiarized themselves with the handgrip task and to read a few messages about muscle strength, which differed according to the experimental group.

Older adults in the incremental condition read that their strength was malleable and could be improved by working (i.e., incremental mind-set), whereas older adults in the entity condition read that their strength was innate, fixed in time and could not be improved even if they worked hard (i.e., entity mind-set). They then performed the first trial. Before the second trial, the experimenter induced a counter-stereotypic message by informing them that the test was free of age-related biases and that adults of all ages performed similarly. At the end of the handgrip test, participants were asked to complete several manipulation-check questionnaires. We assessed their beliefs about the malleability of physical ability (i.e., entity theory of

ability *vs.* incremental theory of ability) and how they endorsed the counter-stereotype related to age and muscle strength.

Measures

Handgrip strength. The MicroFET 4 dynamometer (Hoggan Health Industries, West Jordan, UT) configured for wireless operation with a USB receiver connected to a computer was used to measure handgrip strength (in Newtons). In accordance with the standardized position recommended by the American Society of Hand Therapists (Fess & Moran, 1981), participants were seated with their dominant shoulder adducted and neutrally rotated, the elbow flexed at 90° and the forearm and wrist in neutral position. Hand dominance was determined by asking each participant if she/he was right or left handed. Participants were required to go through two familiarization trials where they were instructed to "squeeze as hard and as fast as possible" to maximum force. A 3-s maximal voluntary contraction (MVC) was used for testing, since it is sufficient to obtain a maximum force value without exposing the participant to such adverse effects as increased blood pressure or heart rate associated with prolonged isometric muscle contraction. Two trials were performed with a 60-s rest period and the best score displaying the highest instantaneous force value was used in the analysis and defined as peak MVC. From these trials, the averaged maximal voluntary contraction (aMVC; the 500-ms average force produced over the peak MVC) and the rates of force development (RFD; the ability to develop force rapidly) were computed. The RFD values ($N.s^{-1}$) were calculated as the slope of the force-time curve over the time intervals of 0-50 and 0-100 ms relative to the onset of contraction (Aagaard, Simonsen, Andersen, Magnusson, & Dyhre-Poulsen, 2002). Also, peak RFD was computed as the highest

slope value that occurred over the initial 200 ms of the force-time curve. Relative RFD values normalized with respect to peak MVC (expressed as %MVC.s^{-1}) were calculated for the different time intervals (RFD 50N, RFD 100N and peak RFD N). The normalized RFD provides information on the participant's capacity to rapidly develop force, thus eliminating the influence of maximal force production.

Implicit theories of ability. Entity and incremental theories of ability were measured using the "Conceptions of the Nature of Athletic Ability Questionnaire" (CNAAQ; Sarrazin et al., 1996). Given that we were interested in older adults' beliefs about physical activity, we replaced the term "sport" by "physical activity" (Moreno, González-Cutre, Sicilia, & Spray, 2010; Ommundsen, 2003). We also adapted the questionnaire to muscle strength. The tool included six items: (a) three items measured beliefs related to the stability of physical abilities, corresponding to the adoption of an entity theory (e.g., "Muscle strength in physical activities changes little even if much effort is made"), and three items measured beliefs related to the improvement of physical abilities, corresponding to the adoption of an incremental theory (e.g., "We have to work hard to build muscle strength in physical activities"). Participants answered on a 7-point Likert scale ranging from 1 (completely disagree) to 7 (completely agree). Confirmatory factor analyses were performed with AMOS 21.0 (Arbuckle, 2006) to test the factorial structure of the scale. The model presented good fit to the data [χ^2 (8) = 20.78, p = .008, N = 65, NNFI = .958, CFI = .974, RMSEA = .10, CI RMSEA = .076 / .195]. Furthermore, each subscale presented good reliability ($\alpha_{\text{incremental theory}}$ = .78, $\alpha_{\text{entity theory}}$ = .81).

Counter-stereotypic message endorsement. We used three items (e.g., "Muscle strength does not depend on age") to evaluate how participants endorsed the

counter-stereotype related to age and muscle strength. Participants answered on a 7-point Likert scale ranging from 1: completely disagree to 7: completely agree. Items were coded such that higher scores indicated greater ease of endorsement.

Data analysis

For each dependent variable, a repeated measures analysis of variance (ANOVA) was tested with group (i.e., entity theory *vs.* incremental theory) as the between-participant factor and time (i.e., stereotype threat context *vs.* counter-stereotypic context) as the within-participant factor. Fischer LSD post-hoc tests were performed to analyze the experimental conditions, for each measurement time. The pretest scores were included as covariates and the significance level was preselected at 5%. For the manipulation check, Student's *t* tests were used for group mean comparisons.

4.3. Results

Manipulation check

Student's *t* tests revealed that participants in the incremental theory group had significantly higher incremental mind-sets (M = 6.34; SD =1.28) than those assigned to the entity theory group (M = 2.20; SD = 0.97), $t(1, 63) = 13.36$, $p < .001$, Cohen's d = 3.75, while participants in the entity theory group had higher entity mind-sets (M = 5.90; SD = 1.06) than those in the incremental theory group (M = 2.60; SD = 1.27), $t(1, 63) = -12.71$, $p < .001$, Cohen's d = -3.70.

Mean scores for endorsement of the counter-stereotype were not significantly

different between participants in the incremental theory group (M = 6.35; SD = 1.13) and those in the entity theory group (M = 6.26; SD = 1.06), $t(1, 63) = 9.61$, $p = .36$, Cohen's $d = 2.85$.

Handgrip strength

Means and standard deviations of muscle strength measures in both groups are presented in Table 1.

Table1. Means and standard deviations of muscle strength measures in both groups for each experimental condition.

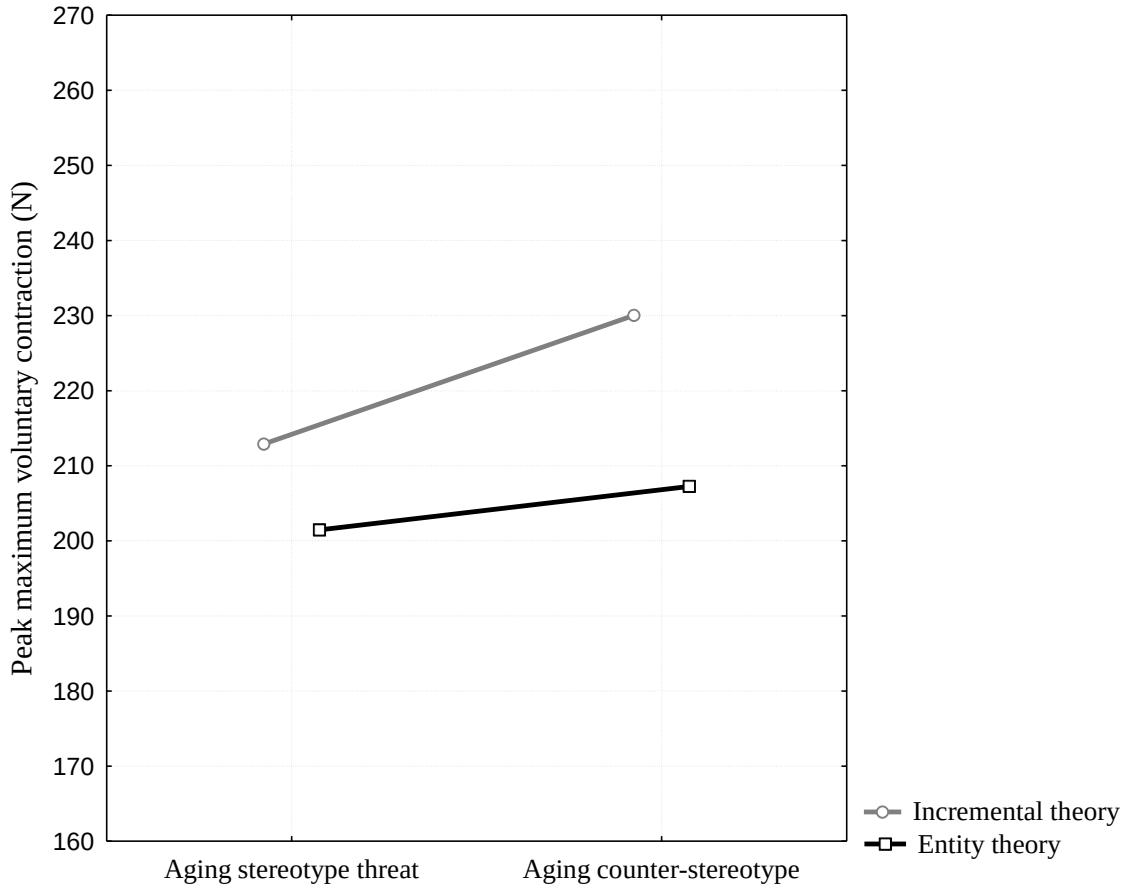
	Entity group		**Incremental group**	
	Aging stereotype threat	Aging counter-stereotype	Aging stereotype threat	Aging counter-stereotype
Muscle strength				
Peak MVC (N)	201.5 ± 80.2	207.3 ± 74.1	212.9 ± 93.0	230.3 ± 92.1
Peak RFD ($N.s^{-1}$)	1156.4 ± 616.7	1119.2 ± 667.5	1164.9 ± 801.6	1402.5± 784.9
Peak RFDN ($\%MVC.s^{-1}$)	594.2 ± 329.5	524.0 ± 220.0	525.3 ± 226.0	603.5 ± 210.4
RFD 50 ($N.s^{-1}$)	752.1 ± 580.0	707.2 ± 607.5	811.5 ± 603.5	1081.2 ± 708.7
RFD 50N ($\%MVC.s^{-1}$)	386.7 ± 258.3	332.4 ± 251.4	372.3 ± 236.2	462.0 ± 234.6
RFD 100 ($N.s^{-1}$)	513.6 ± 513.6	753.1 ± 569.8	847.8 ± 608.0	1018.9 ± 647.1
RFD 100N ($\%MVC.s^{-1}$)	394.6 ± 208.1	349.6 ± 213.9	377.9 ± 180.2	427.7 ± 176.7
aMVC (N)	195.3 ± 79.5	205.3 ± 82.9	210.9 ± 112.7	222.2 ± 110.3

Notes. N: Newton; $N.s^{-1}$: Newtons per second.

Peak maximal voluntary contraction (Peak MVC). The ANOVA revealed a significant group x aging counter-stereotype related to muscle strength interaction,

$F(1, 63) = 3.79$, $p < .05$, $\eta^2 = .06$. The scores of peak MVC were significantly higher in the incremental theory group after the aging counter-stereotype information ($p < .05$), whereas those in the entity theory group remained constant ($p = .18$) (Figure 1).

Figure 1. Peak Maximal Voluntary Contraction by Experimental Conditions

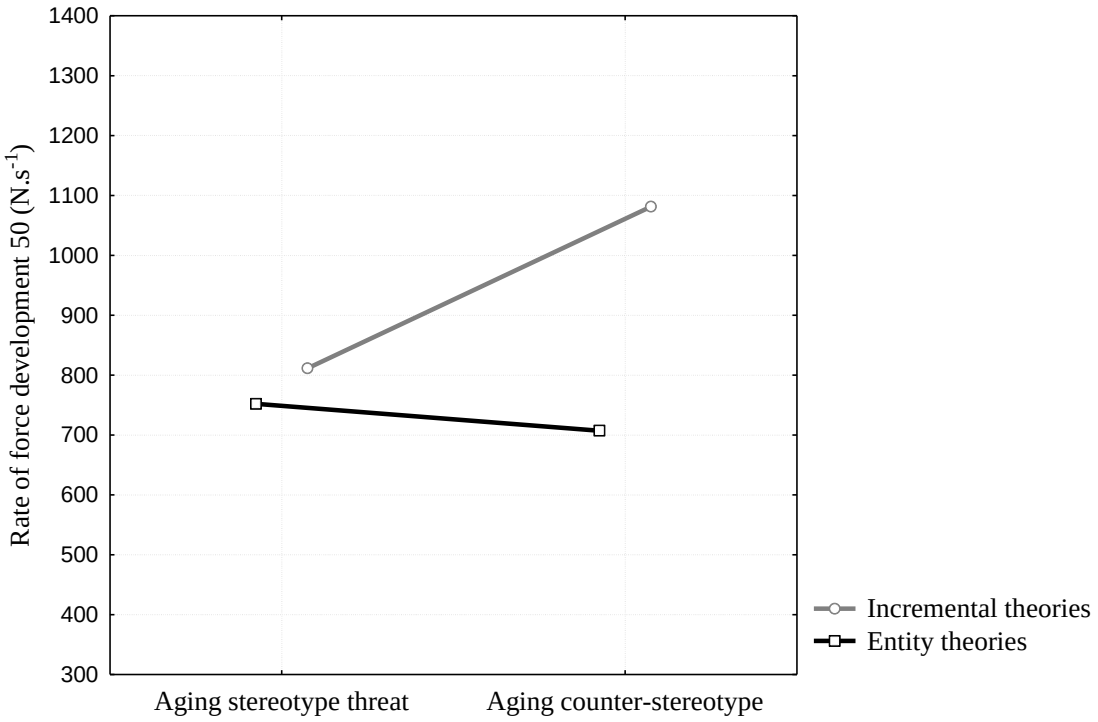


Note. Peak maximal voluntary contraction (in Newtons)

Rate of force development 50 (RFD 50). The ANOVA revealed a significant group x aging counter-stereotype related to muscle strength interaction, $F(1, 63) = 5.18$, $p < .05$, $\eta^2 = .08$. The RFD 50 score significantly improved in the incremental theory group after countering the stereotype threat ($p < .01$). Besides, the RFD 50 score was significantly higher in the incremental theory group after countering the

stereotype threat ($p < .05$) than in the entity theory group ($p = .65$) (Figure 2).

Figure 2. Rate of Force Development 50 by Experimental Conditions



Note. RFD 50: Newtons per second ($N.s^{-1}$).

RFD 50N. The ANOVA revealed a significant group x aging counter-stereotype related to muscle strength interaction, $F(1, 63) = 4.20$, $p < .05$, $\eta^2 = .06$. The RFD 50N score was significantly improved in the incremental theory group after countering the stereotype threat ($p < .05$) compared with the entity theory group ($p = .36$).

No significant group x counter-stereotype interaction was found for the averaged maximal voluntary contraction (aMVC), peak RFD, peak RFD N, RFD 100 and RFD 100N.

4.4. Discussion

In this research, we found evidence that an aging counter-stereotype related to muscle strength could moderate the effects of implicit theories of ability in older adults. We had originally assumed that the mind-set imposed by counter-stereotype information would be strong enough to overwhelm an individual's own implicit beliefs of ability, and the findings were partly consistent with our hypotheses. Older adults assigned to the incremental mind-set condition obtained the highest scores for some components of muscle strength (i.e., peak MVC, RFD 50, and RFD 50N) after exposure to the aging counter-stereotype, whereas those in the entity mind-set condition were not significantly influenced by this counter-stereotype.

First, our results indicated that the aging counter-stereotype related to muscle strength positively moderated the effect of an incremental mind-set on older adults' muscle strength. Indeed, the incremental mind-set participants obtained better scores on peak MVC and RFD 50 after the counter-stereotype and produced higher scores on RFD 50 and RFD 50N than the entity mind-set participants in the same condition. These results are consistent with the findings of previous studies suggesting that counter-stereotypes activate a mind-set leading to cognitive flexibility and better creative performance (De Dreu et al., 2008; Goclowska et al., 2012). These results also suggest that an incremental mind-set and counter-stereotyping rely on proximal cognitive processes (Plaks et al., 2001). Indeed, although the two intervention messages in this study appear to be different, they can be seen as activating the similar mechanism of perceived control (Blair, Ma, & Lenton, 2001; Dweck & Leggett, 1988). We also found that older adults with an entity mind-set were not influenced by the aging counter-stereotype related to muscle strength. A possible

explanation could be that the aging counter-stereotype and entity theory mind-set were cognitively inconsistent. A study by Plaks et al. (2001) provides evidence that attention to stereotype-consistent *vs*. inconsistent information depends on people's implicit theories about human traits. Individuals holding an entity theory consistently displayed greater attention to and recognition of consistent (i.e., stereotypic) information whereas those holding an incremental theory tended to display greater attention to and recognition of inconsistent (i.e., counter-stereotypic) information. It can thus be hypothesized that some older adults have a disposition toward entity theory of ability that resists counter-stereotype messages. Further research could examine this hypothesis.

Another interesting set of results is that the aging counter-stereotype did not influence the effects of incremental theory of ability on the variables related to older adults' muscle strength in the same way. Specifically, we found that after the counter-stereotyping, the peak MVC was improved in the incremental mind-set participants, but also their scores on RFD 50 and RFD 50N were greater compared with the entity mind-set group. However, no differences were observed on strength maintenance (i.e., aMVC), peak RFD, peak RFD N, RFD 100 or RFD 100N. These findings suggest that the positive effects of incremental theory and counter-stereotyping would be particularly salient for the preparatory processes of strength performance (Raghavan, Krakauer, & Gordon, 2006).

The increase in peak MVC in the incremental mind-set participants could be explained through motivational consequences (Dweck & Leggett, 1988). Indeed, previous work has shown the positive effects of verbal encouragement on maximal voluntary contraction (McNair, Depledge, Brettkelly, & Stanley, 1996). Also, and

contrary to the voluntary RFD measured in the later phase of muscle contraction which depends on MVC, the voluntary RFD in the very early phase of muscle contraction, such as the RFD 50 measured in the present study, is less related to MVC and neural drive to the muscle may have a very important influence on RFD during this phase of contraction (Andersen & Aagaard, 2006; Van Cutsem, Duchateau, & Hainaut, 1998). Therefore, the enhanced RFD 50 score observed in the incremental mind-set participants after aging counter-stereotype might be ascribable to a neural adaptation as it is unlikely that changes within the muscle could have occurred during the short duration of the experiment. This suggestion is further reinforced by the increased of RFD 50N which eliminates the influence of maximal force production and thus, provides information on the true capacity to rapidly develop force. Finally, consistently with Chalabaev et al. (2013) who reported that stereotype threat inhibited RFD by influencing the preparatory processes associated with the upcoming motor task our findings suggest that incremental theory of ability combined to aging counter-stereotype could unconsciously improve neural drive to the muscle. In light of these observations, it could be speculated that the higher motivation entailed by incremental and counter-stereotypic mind-sets could have some beneficial effects on motor unit recruitment through a disengagement of supraspinal inhibition acting on the motor units (Belanger & McComas, 1981).

Some limitations of the current research need to be considered and open promising research avenues. First, our sample was mainly composed of older women, who may have had gender stereotypes in addition to aging stereotypes (e.g., Pinquart & Sörensen, 2001). Future research could thus replicate this study with males to better control this confounding effect. Second, the present study was designed to test the effectiveness of an aging counter-stereotype in modulating the effects of implicit

theories of ability on muscle strength in older adults. Future studies could examine the interaction effect of implicit theories of ability and stereotypic context (threat *vs.* no threat) on older adult's muscle strength or other physical capacities such as balance. Our study also revealed that an aging counter-stereotype combined with incremental theory was successful, but was unsuccessful with entity theory. Why did the entity theory resist the aging counter-stereotype? An intervention study with explicit stereotype threat could be designed to examine the relationship between entity theory and stereotype threat. Last, this study measured variables on muscle strength at a point in time but did not provide evidence of a causal relationship. It would be interesting to examine the nature of these relationships over time through a longitudinal experimental study using several messages of age-related counter-stereotyping repeatedly.

In summary, from the perspective of public health promotion of exercise in the elderly, the results of this study are encouraging because they suggest that individuals with an incremental mind-set who are exposed to aging counter-stereotypes can boost their physical performance. We are not aware of other studies that have specifically considered the role of aging counter-stereotypes in modulating the effects of implicit theories of ability on muscle strength. Messages that promote an incremental mind-set and aging counter-stereotypes should perhaps be emphasized. This study thus paves the way for future research aiming at a better understanding of implicit theories of ability and aging stereotypes as sources of greater physical activity in older adults.

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Synthèse de l'étude 4

L'objet de cette étude expérimentale était d'examiner dans quel contexte (stéréotypique *vs.* contre-stéréotypique) les théories implicites de l'habileté étaient les plus efficaces sur une tâche de force musculaire. Soixante cinq seniors retraités (10 hommes et 55 femmes ; M = 74.5 ans, ET = 6.5) ont été invités à réaliser une tâche de force à deux reprises. Les participants ont été répartis aléatoirement dans deux conditions expérimentales (i.e., groupe théories de l'entité *vs.* groupe théories incrémentielles). Des messages reposant sur des informations contre-stéréotypiques en lien avec le vieillissement, et sur les théories implicites de l'habileté relatives à la force musculaire des seniors ont été délivrés aux participants. Les résultats ont montré que les participants du groupe théories incrémentielles (a) ont obtenu de meilleurs scores de contraction musculaire volontaire maximum et de taux de développement de la force à 50 ms (RFD 50) dans le contexte contre-stéréotypique comparativement à leurs scores initiaux ; et (b) ont rapporté des scores de développement de force (RFD 50 et RFD 50N) plus élevés que les participants du groupe théories de l'entité dans la même condition. Ces résultats indiquent que les messages contre-stéréotypiques sont plus efficaces quand les personnes adhèrent à

une conception incrémentielle de l'habileté, suggérant ainsi que ces messages seraient saillants au niveau des processus préparatoires de la performance de force chez des seniors actifs. Toutefois, les seniors de la condition théories de l'entité sembleraient résister aux informations contre-stéréotypiques puisque leurs résultats ne sont pas apparus sensibles au contexte.

Compte tenu du caractère expérimental et du cours terme des informations données, nous avons souhaité poursuivre nos investigations au travers d'une étude interventionnelle combinant des messages d'informations contre-stéréotypiques relatifs au vieillissement à un programme d'activité physique adaptée. Ainsi, l'objet de notre dernière étude était d'examiner l'effet d'une activité de marche hebdomadaire supervisée et individualisée combinée à des informations contre-stéréotypiques et leur influence sur l'activité physique, l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique, la qualité de vie, et la condition physique de seniors sédentaires.

ETUDE 5

Effects of Supervised and Individualized weekly Walking on Aging Exercise Stereotypes and Quality of Life of Older Sedentary Females[1]

[1] Cet article a fait l'objet d'une publication :
Emile, M., Chalabaev, A, Clément-Guillotin, C., Pradier, C., Colson, S. S., & d'Arripe-Longueville, F. (2012). Effects of Supervised and Individualized weekly Walking on Aging Exercise Stereotypes and Quality of Life of Older Sedentary Females. *Science & Sports, 29,* 156-163.

Erratum : Dans le tableau de corrélations, merci de lire .37* et non .08, pour la valeur du r de Pearson indiquant les relations entre le score du SAP et celui du TM6, à l'issue du programme.

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ORIGINAL ARTICLE

Effects of supervised and individualized weekly walking on exercise stereotypes and quality of life in older sedentary females

Effets d'une activité de marche hebdomadaire supervisée et individualisée sur les stéréotypes relatifs à l'activité physique et la qualité de vie de femmes âgées sédentaires

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KEYWORDS
Sedentarity;
Stereotypes;
Elderly;
Quality of life;
Physical activity

Summary
Objective. — This study examined the effects of a walking program on exercise stereotypes, quality of life and health-related functions of older sedentary females.
Methods. — Fifty-two older sedentary females (M_{age} = 78.54 years, age range: 67—97; *SD* = 7.37) participated in the study. The 3-month physical activity (PA) program, which consisted of two 45-minute supervised and individualized walking sessions per week, was associated with the activation of counter-stereotypical information about the benefits of PA for older adults, as well as self-efficacy enhancement techniques.
Results. — The results showed that compared to the control group, the PA group scored higher for beliefs about the benefits of PA in the elderly, perceived physical value and sport competence, physical appearance, quality of life, and physical endurance, and scored lower for beliefs about the negative effects of PA.
Conclusion. — These findings indicate that beliefs about PA can be enhanced in old sedentary females through targeted PA intervention, thus providing support to a malleable conception of exercise stereotypes in older adults.

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MOTS CLÉS
Sédentarité ;
Stéréotypes ;
Personnes âgées ;
Qualité de vie ;
Activité physique

Résumé
Objectif. — Cette étude a examiné les effets d'un programme de marche sur les stéréotypes relatifs à l'activité physique, la qualité de vie et la condition physique de femmes âgées sédentaires.
Méthode. — Cinquante-deux femmes âgées sédentaires (M_{age} = 78,54 ans, âgée de 67 à 97 ans; SD = 7,37) ont participé à l'étude. Le programme d'une durée de trois mois était constitué de deux séances hebdomadaires de marche de 45 minutes, encadrées et personnalisées, au cours desquelles des informations contre-stéréotypiques sur l'activité physique chez les personnes âgées étaient délivrées.
Résultats. — Les résultats ont montré que, comparativement au groupe témoin, le groupe activité physique a obtenu, (a) des scores plus élevés sur les croyances concernant les bénéfices de l'activité physique pour la santé, les perceptions de la valeur physique et de la compétence sportive, l'apparence physique, la qualité de vie et l'endurance physique, et (b) des scores plus faibles sur les croyances concernant les risques de l'activité physique pour la santé.
Conclusion. — Ces résultats indiquent que les croyances relatives à l'activité physique chez les personnes âgées, peuvent être améliorées chez des femmes âgées sédentaires grâce à une intervention adaptée, apportant ainsi un appui à une conception malléable des stéréotypes.

1. Objectives

The benefits of physical activity (PA) for successful aging have been clearly delineated in several meta-analyses and literature reviews [1—3]. These studies have shown that PA may prevent certain diseases (cardiovascular disease, diabetes, obesity, and cancer) and maintain both functional capacities (i.e., lower likelihood of falling, lower risk of fracture [4—6]) and cognitive capacities [7]. Other studies have shown the positive effects of PA on affect [8,9], self-perception [10], life expectancy and quality of life [11,12].

Despite these benefits, most older adults remain insufficiently active (i.e., more than 60% of people aged 65 years and over are sedentary; Ministry of Health, Youth, and Sport, 2005). Several obstacles to PA have been identified in this population, including physical, material, and environmental factors, as well as psychological issues. Among these latter, the impression of ''not being capable of participating in sports'' is one of the chief reasons cited by older adults [13]. This widespread conviction suggests that older sedentary adults have internalized negative stereotypes about aging and have negative perceptions of their physical capacities [14—16]. Stereotypes can be defined as shared beliefs about personal characteristics, usually personality traits but also behaviors, of a specific group [17].

Older women may be considered as a doubly stigmatized population: they are targeted by negative gender-related stereotypes (for a meta-analysis see Pinquart and Sörensen [18]) and negative stereotypes about aging. The study of Cuddy et al. [19], for example, showed that older people are perceived by others as not being very competent, these stereotypes are resistant and thus difficult to change. Negative stereotypes about aging may explain in part the low proportion of older adults involved in regular PA. Certain studies have shown that the internalization of such stereotypes by older adults is reflected by more negative attitudes with increasing age, a drop in the feeling of being competent and negative perceptions of PA [20,21]. The level of PA decreases with aging, from 60 years for women and 65 years for men. At 75 years, only 25 % of French older adults remain physically active (French Ministry of Health, Youth and Sport, 2005). More specifically, aging women are less physically active than their male counterparts and less often reach the recommended levels for PA [22,23].

Stereotypes thus can have serious consequences in terms of lifestyle practices and health status. Several studies have shown that activating negative stereotypes about aging can result in negative self-evaluations [24], increased cardiovascular stress [25] and slow motor function [26], and even lower life expectancy [27,28]. Moreover, Wurm et al. [29] observed that stereotypes about aging were the best predictors of health status, rather than the converse. Conversely, other studies have shown that activating positive stereotypes has beneficial effects on self-efficacy, self-image, and the opinions of other older adults [25,30,31].

The challenge that emerges from these studies is to determine how the stereotypes about aging and physical exercise can be modified to encourage older adults to incorporate sufficient PA into their lifestyles. Rowland et al. [32] demonstrated the favorable effects of a program combining PA and education (cardiovascular risk factors, tips on incorporating regular and adapted physical exercise into daily life, and stress management) on perceived health status and information and attitudes about exercise. More recently, Klusmann et al. [33] showed that a PA program of three 90-minute sessions per week for 6 months combined with a motivational approach (i.e., expectations of immediate benefits from the program) positively influenced attitudes about aging in sedentary women over 70 years. These studies [32,33] provide evidence that attitudes about one's own aging and exercise can be influenced by PA programs. It should nevertheless be noted that in the study of Rowland the theoretical intervention was not directly focused on the activation or suppression of stereotypes.

According to Blair [34], several strategies can be employed to modify stereotypes: suppression of negative stereotypes, activation of counter-stereotypes, the focusing of attention, manipulation of contextual cues, and

motivation. Fiske [35] showed that self-confidence and having a sense of belonging, understanding, and control can also modify stereotypes. This study extends the work of Rowland et al. [32] and Klusmann et al. [33]. On the basis of previous work demonstrating the malleability of stereotypes (i.e., Blair [34]), we hypothesized that a supervised PA program targeting indices of context, motivation and self-confidence would positively affect the stereotypes of older adults regarding physical exercise. More specifically, we examined the effects of an individualized and supervised walking program on stereotypes about physical exercise in older adults, quality of life, and physical capacities in a sample of sedentary women aged 65 years and older.

2. Methods

2.1. Participants

The 52 participants were female volunteers, all members of senior citizens clubs in Nice, France. They were sedentary and retired (M_{age} = 78.54 years, age range: 67—97; SD = 7.37). Forty of these participants were widowed and 12 were married. The inclusion criteria were as follows:

- age of at least 65 years;
- sedentarity,;
- autonomy in daily living and the capacity to walk unaided for 45 minutes;
- and medical certification of capacity for walking and adapted physical activities.

According to Robert et al. [36], sedentarity was defined as a score inferior to 18 on the Dijon Physical Activity Score (PAS); confirmation of the level of PA of the participant was obtained from the entourage by comparing their evaluations of the participant on the SAP to the participants' own scores. The results of the intraclass correlation coefficients (ICC) were statistically significant (ICC = 0.74). The self-reported capacity to walk unaided for 45 minutes was an important inclusion criterion in relation to the PA program characteristics. Participants on medication for psychological or psychiatric reasons (i.e., antidepressants, anxiolytics) were not retained.

The participants were randomly divided into two groups of 34 participants as follows:

- an experimental group following an individualized 3-month walking program (PA group);
- and a control group that did not follow a PA program.

2.2. Measures

2.2.1. Stereotypes about older people and exercise.

Senior beliefs about PA were assessed using the Aging Stereotypes and Exercise Scale (ASES) (Chalabaev et al. [37], in press). This questionnaire consists of 12 items divided into three subscales:

- psychological barriers (i.e., ''older adults are convinced that they are capable of exercising'');
- exercise benefits (i.e., ''exercise raises older adults' spirits'');
- and exercise risks (i.e., ''the physical capacities of older adults are too diminished for exercise'').

The participants responded on a 7-point Likert scale ranging from 1 (completely disagree) to 7 (completely agree). In this study, each subscale presented good reliability ($\alpha_{\text{psychological barriers}} = 0.80$, $\alpha_{\text{benefits of exercise}} = 0.82$, $\alpha_{\text{risks of exercise}} = 0.75$).

2.2.2. Quality of life

Quality of life was measured by the French version of the World Health Organization Quality of Life (WHOQOL-26) instrument validated by Leplège et al. (in 2000) [38]. Respondents fill out the questionnaire with regard to their feelings of health over the past 4 weeks. The WHOQOL-26 provides scores in four domains: physical health (six items), psychological health (five items), social relationships (three items), and environment (eight items). The participants answered on a 6-point Likert scale ranging from 1 (completely disagree) to 6 (completely agree). We did not use the first general question of the WHOQOL-26. After a pilot-study, we removed two items that appeared not relevant for participants of this age (an item on satisfaction of sexual life and an item on the ability to work). The internal consistency of the subscales was satisfactory ($\alpha_{\text{physical health}} = 0.83$, $\alpha_{\text{psychological health}} = 0.74$, $\alpha_{\text{social relationship}} = 0.79$, $\alpha_{\text{environment}} = 0.85$).

2.2.3. Physical self-worth

Physical self-worth was measured using three subscales of the Physical Self Inventory (PSI-25), the French adaptation of the Physical Self-Perception Profile (PSPP) of Fox and Corbin (in 1989) [39], validated by Ninot et al. (in 2000) [40]. The PSI is composed of 25 items and six subscales (global self-esteem, perceived physical value, endurance, sport competence, physical appearance, and physical strength). Only the subscales of perceived physical value, physical appearance, and sport competence were selected, whereas the other subscales were deemed not adapted to the target population or the study objective. Participants answered on a 6-point Likert scale ranging from 1 (completely disagree) to 6 (completely agree). The internal consistency of the subscales was satisfactory ($\alpha_{\text{perceived physical value}} = 0.78$, $\alpha_{\text{sport competence}} = 0.81$, $\alpha_{\text{physical appearance}} = 0.73$).

2.2.4. Physical Activity Score

The level of PA was calculated for each participant from the Dijon Physical Activity Score (or PAS) of Robert et al. (in 2004) [36], which is based on the European program requirements for ''Better Aging'' (Foxet et al., in 2007) [41]. This questionnaire consists of nine items related to different types of activity; the intensity, duration and frequency of the corresponding effort; and the environmental conditions. The total score of these items is calculated on 30 points and corresponds to a level of PA. Individuals who score below 18 are considered as sedentary; those who score below 10 are very sedentary.

2.2.5. The 6-minute walk test (6MWT)

The 6MWT was conducted according to the recommendations of the American Thoracic Society (ATS) [42]. The instructions given to the participants were to walk the farthest possible distance in 6 minutes, back and forth between two markers spaced 30 m apart, while keeping the walking speed as regular as possible. The investigator encouraged the patients every minute with standardized phrases and announced the elapsed time. The 6MWT is considered an adequate test to reflect daily activity [43] and it has been validated for use in the elderly [44]. This test was performed under the same conditions pre- and post-program.

2.3. Intervention program

The intervention procedure had three main phases:

- initial assessment at T0;
- the 3-month supervised walking program;
- and final assessment at T3month.

The T0 and T3month assessments measured physical abilities (i.e., PAS, 6MWT) and several psychosocial indicators (i.e., stereotypes related to PA in older adults, physical self-worth and quality of life) before and after the 3-month walking program.

The individualized program lasted 3 months with two 45-minute training sessions per week on average. Walking was the main PA as it is suitable for sedentary seniors, as reported in several studies [9,45]. As the intervention was by nature individualized, no procedure to standardize the program was undertaken. The average distance traveled was between two and three kilometers, depending on the motivation and physical abilities of the participants.

The intervention also incorporated strategies used in previous studies to change stereotypes by suppressing negative stereotypes and activating positive stereotypes [34]. This was accomplished by providing information about the positive effects of PA for older adults [12] raising the participants' feelings of self-efficacy by the choice of situations accessible, and providing high social support [35,46].

The main steps were thus as follows:

- explaining the program objectives to each participant;
- establishing a profile of the individual's physical abilities from the initial tests;
- fixing short- and middle-term objectives with the person;
- and weekly walking, with two 40- to 60-minute sessions in the presence of their guide (simulation of success, self-evaluation of the distance traveled).

2.3.1. Data analyses

For each dependent variable, analysis of covariance (ANCOVA) with planned simple contrast was used to test for differences between the PA and control groups. The pretest scores were included as covariates and the significance level was preselected at 5 %.

3. Results

3.1. Descriptive analyses

Means and standard deviations for each dependent variable are presented in Table 1. At the beginning of the program, both groups were characterized by relatively high scores in perceived physical capacity and perceived benefits of exercise on health, and medium scores of perceived risks of exercise. The two groups were also characterized by high scores of quality of life, and medium scores of self-esteem. Finally, the scores of physical capacity were low (between 10.56 and 12.50). At the end of the walking program (T3month), the experimental group showed an increase in all scores, and reported lower scores of perceived risks, while scores of the control group remained stable over time, or even decreased.

Pearson's correlations between variables are presented in Table 2. The correlation coefficients showed that (a) the perceived benefit of exercise was positively correlated with perceived physical value, sport competence, psychological health, and PA level, (b) perceived exercise risks were negatively correlated with perceived physical value, environment, physical appearance, and PA level.

3.1.1. Exercise stereotypes

3.1.1.1. Exercise benefits. The ANCOVA revealed a significant group effect, $F(1,49) = 28.08$, $P < 0.01$, $\eta^2 = 0.36$. These results indicate that beliefs about the benefits of exercise for health were stronger in the PA group after the program, whereas those in the control group remained constant.

3.1.1.2. Exercise risks. The ANCOVA showed a significant group effect, $F(1,49) = 11.29$, $P < 0.01$, $\eta^2 = 0.19$. The belief about the risks of exercise for the health of older adults was less strong in the PA group at the end of the program, whereas those in the control group remained constant.

3.1.2. Quality of life

3.1.2.1. Physical health (PH). The ANCOVA indicated a trend for a group effect, $F(1,49) = 3.56$, $P = 0.06$, $\eta^2 = 0.07$. This score suggests that the PA group improved its perceived physical health at the end of the program, while the control group showed no improvement.

3.1.2.2. Psychological health (PsyH). The ANCOVA revealed a trend for a group effect, $P = 0.07$, $F(1,49) = 3.28$, $\eta^2 = 0.06$. The PA group showed higher scores for perceived psychological health at the end of the program than in the beginning, whereas the control group showed no improvement.

3.1.2.3. Social relationship (SR). The ANCOVA showed a significant group effect, $F(1,49) = 8.65$, $P < 0.05$, $\eta^2 = 0.15$. The PA group showed improvement in social relationships at the end of the 3-month program, whereas the control group remained stable.

3.1.3. Physical self-worth

3.1.3.1. Perceived physical value (PPV). The ANCOVA indicated a significant group effect, $F(1,49) = 16.51$, $P < 0.01$, $\eta^2 = 0.25$. Perceived physical value improved at T3month for the PA group, but not for the control group.

Table 1 Means and standard deviations of various measures in T0 and T3month in both groups.

	EP		CG	
	T0	T3month	T0	T3month
Stereotypes PA-older people				
Psychological barriers (PsyB)	4,63 ± 1,09	5,07 ± 1,42	4,70 ± 0,99	4,61 ± 0,77
Perceived benefits (PB)	5,98 ± 1,12	6,52 ± 0,56	5,79 ± 0,87	5,71 ± 0,76
Perceived risks (PR)	3,73 ± 1,36	2,86 ± 1,48	3,34 ± 0,93	3,71 ± 1,00
Quality of life				
Physical health (PH)	3,96 ± 0,66	4,25 ± 0,79	4,16 ± 0,89	4,03 ± 0,85
Psychological health (PsyH)	4,36 ± 0,86	4,68 ± 0,79	4,12 ± 1,15	4,22 ± 1,10
Social relationships (SR)	4,88 ± 1,15	5,12 ± 0,77	4,24 ± 1,56	4,24 ± 1,28
Environment (Env)	4,37 ± 0,71	4,52 ± 0,77	4,16 ± 0,80	4,36 ± 0,92
Physical self-esteem				
Perceived physical value (PPV)	3,68 ± 1,08	4,24 ± 0,89	3,14 ± 1,13	3,10 ± 1,05
Sport competence (SC)	2,98 ± 1,14	3,65 ± 1,06	2,61 ± 1,48	2,49 ± 1,27
Physical appearance (PApp)	4,10 ± 0,65	3,91 ± 0,59	3,81 ± 0,70	4,13 ± 0,78
Physical capacities				
6MWT distance	183,97 ± 54,55	203,82 ± 55,47	185,83 ± 42,09	180,83 ± 41,52
Physical Activity Score (PAS)	10,56 ± 3,33	19,21 ± 3,00	12,50 ± 3,53	12,39 ± 3,91

EP: experimental group; CG: control group; PA: physical activity. For stereotypes variables, participants had to answer on a seven-points Likert type scale; for Quality of Life and Physical Self-Esteem, they had to answer on a six-points Likert type scale. 6MWT distance was measured in meters. The PAS was from 0 to 30 points.

3.1.3.2. Sport competence (SC). The ANCOVA revealed a significant group effect, $F(1,49) = 15.25$, $P < 0.01$, $\eta^2 = 0.24$. Sport competence was improved after the program for the PA group, but not for the control group.

3.1.3.3. Physical appearance (PApp). The ANCOVA indicated a significant group effect, $F(1,49) = 4.17$, $P < 0.05$, $\eta^2 = 0.08$. Physical appearance improved at T3month for the PA group, but not for the control group.

3.1.4. Physical capacities

3.1.4.1. Physical Activity Score (PAS). The ANCOVA showed a significant group effect, $F(1,49) = 71.85$, $P < 0.001$, $\eta^2 = 0.59$. The PA group improved its PAS, whereas the control group remained stable.

3.1.4.2. The 6-minute walk test (TM6). The ANCOVA indicated a significant group effect, $F(1,49) = 58,26$, $P < 0.001$, $\eta^2 = 0.54$. The PA group showed an improvement in the TM6 distance, $P < 0.05$, while the control group remained stable between T0 and T3month.

For psychological barriers, and environment, the ANCOVAs revealed no significant group effect. With regard to the environment, ANOVA showed a significant effect of time, $F(1,49) = 45.73$, $P < 0.001$, $\eta^2 = 0.48$. Whatever the group, there was an improvement over time in the subscale of environment at the end of program.

Table 2 Matrix of Pearson r correlation coefficients between the variables ($n = 52$).

	1. PsyB	2. PB	3. PR	4. PH	5. PsyH	6. SR	7. Env	8. PPV	9. SC	10. PApp	11. 6MWT	12. PAS
1. PsyB	–											
2. PB	0.15	–										
3. PR	−0.11	−0.51**	–									
4. PH	0.23	0.09	−0.16	–								
5. PsyH	−0.01	0.28*	−0.07	0.54**	–							
6. SR	0.11	0.21	−0.16	0.33	0.56**	–						
7. Env	0.14	0.14	−0.34*	0.27*	0.41**	0.52**	–					
8. PPV	0.22	0.56**	−0.38**	0.40**	0.61**	0.43**	0.26	–				
9. SC	0.24	0.50**	−0.20	0.36**	0.54**	0.34*	0.24	0.81**	–			
10. PApp	0.08	0.13	−0.34*	−0.07	−0.11	−0.04	0.18	0.01	0.09	–		
11. 6MWT	−0.07	−0.08	0.13	−0.05	−0.12	−0.11	−0.34*	0.04	0.18	−0.10	–	
12. PAS	0.05	0.45**	−0.62**	0.09	0.06	0.37**	0.33*	0.38**	0.26	0.10	0.08	–

PsyB: psychological barriers; PB: perceived benefits; PR: perceived risks; PH: physical health; PsyH: psychological health; SR: social relationships; Env: environment; PPV: perceived physical value; SC: sport competence; PApp: physical appearance; 6MWT: 6-minute walking test; PAS: Physical Activity Score. *$P < 0.05$; **$P < 0.01$.

4. Discussion

This study examined the effects of a supervised walking program on the stereotypes linked to PA in older people, quality of life, and physical fitness in sedentary women over 65 years old. The main results showed that the participants in the 3-month individualized walking program held more positive beliefs about PA, quality of life and physical capacities than the control subjects.

More particularly, the PA group had lower scores for the perceived risk associated with PA and higher scores for the perceived benefits of PA than the controls. This finding enriches earlier studies that have shown the relationship between psychological barriers to exercise and the type of PA involvement [47], as well as those that have shown PA program effects on attitudes about aging [33] and attitudes about exercise [32]. Indeed, the original contribution of this study was the demonstration that a supervised walking program associated with an educational segment was able to modify perceptions of PA benefits and risks held by older adults, which was not specifically shown in other studies [32,33] Our findings confirm that a PA program with well-adapted strategies can positively affect the stereotypes held by a target group [15,34]. Based on these findings and the reports in the literature [48,49], we therefore hypothesize that the PA participants were progressively able to suppress negative stereotypes and activate positive beliefs.

Second, our results showed the positive effects of a supervised PA program on perceived physical value, sport competence, physical appearance and quality of life. These results are in accordance with studies showing that PA in older adults has favorable effects on quality of life as measured by two scales (MOS SF-36; WHOQOL-26), particularly self-efficacy, physical self-esteem, mental health, and positive affect [20,50,51].

Third, we showed that the program had positive effects on the PA level and physical capacities of this older population. The PA participants changed their status from sedentary to physically active and improved their endurance, as evidenced by the 6MWT. This observation supports the literature [20,52,53] showing that PA positively effects functional capacity and prevents falls. Moreover, we add to the literature by showing the positive effects of exercise on physical capacities, as revealed by the PAS and the 6MWT, even though the weekly volume (1.5 to 2 hours) and program duration (3 months) did not meet the WHO recommendations (minimum 2.5 hours per week).

The statistical tests showed no effect of the program on beliefs and psychological barriers, however. We therefore hypothesize that, as these beliefs were held by our seniors about the elderly population in general, they were deeply anchored and hard to modify in only 3 months. We suspect that it might be worthwhile to extend the duration of this type of program.

The examination of the correlations between variables at the end of the program showed that the improved scores regarding the benefits of PA were accompanied by improved scores in perceived physical value, sport competence, physical health, and PA. Last, high scores for perceived PA risk were paralleled by low PA scores. A study with a much larger sample is now needed to determine whether stereotypes mediate the relationship between exercise participation and perceptions of physical self in older adults.

The small sample size of women only was a limitation of this study, as is the case in many studies on older adults [24,26,54]. Another limitation of this study was an insufficient number of evaluation points, as we were unable to determine the long-term behavioral changes observed in the study. An additional evaluation of psychosocial indicators and physical capacities several months after the program end would address this issue. A third limitation concerns the combination of PA and supervisory activity at the core of the program, as supervision in itself constitutes a psychosocial intervention with regard to stereotypes and self-perceptions. Future experimental studies could thus examine these effects separately.

Although doubts persist about the possibility of transforming the attitudes and beliefs of the elderly [6,15], and in spite of the small sample, this study suggest that a program combining PA, strategies to activate counter-stereotypical beliefs, and support to self-esteem could modify beliefs about exercise and improve self-perceptions and quality of life in older female adults. This study provides guidance for developing better strategies to promote PA to older sedentary adults, notably by overcoming psychological barriers, changing stereotypes [15], and providing social support. These types of PA programs would help a greater number of adults to age more successfully by prolonging physical, functional and social health and ensuring psychological well-being [55].

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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Synthèse de l'étude 5

L'objectif de cette étude était d'examiner les effets d'un programme de marche et d'un accompagnement psychosocial sur les stéréotypes relatifs à l'activité physique, la qualité de vie et la condition physique de femmes âgées sédentaires. Cinquante deux femmes seniors sédentaires (*M* = 78.54 ans *; ET* = 7.37) ont participé à l'étude. Le programme d'une durée de trois mois était constitué de deux séances hebdomadaires de marche de 45 minutes, encadrées et personnalisées. La procédure d'intervention psychosociale a intégré des stratégies utilisées dans des études antérieures visant à modifier les stéréotypes par la suppression de stéréotypes négatifs et l'activation de stéréotypes positifs (Blair, 2002), l'apport de connaissances sur les effets positifs de l'AP pour les seniors (Chodzko-Zajko et al., 2009), l'élévation du sentiment d'auto-efficacité des participantes par le choix de situations accessibles et un fort soutien social (Bandura, 1997 ; Fiske, 1998). Les résultats ont montré que, comparativement au groupe témoin, le groupe activité physique a obtenu, des scores plus élevés sur les stéréotypes relatifs aux bénéfices perçus de l'activité physique, les perceptions de la valeur physique et de la compétence sportive, l'apparence physique,

la qualité de vie et l'endurance physique, et des scores plus faibles sur les stéréotypes relatifs aux risques perçus de l'activité physique. Ces résultats indiquent que les stéréotypes liés à l'activité physique chez les seniors, pouvaient être modifiés favorablement chez des femmes âgées sédentaires grâce à une intervention adaptée. Ces résultats vont à l'encontre de l'idée selon laquelle les stéréotypes seraient stables et difficiles à changer (Cuddy et al., 2005).

Des mesures ont été réalisées trois mois après l'arrêt du programme de marche sur toutes les variables. Ces analyses ont révélé que comparativement au groupe témoin, le groupe activité physique et accompagnement a rapporté à T6 mois des scores plus élevés d'adhésion aux stéréotypes relatifs aux bénéfices perçus de l'activité physique, et d'endurance. Ces résultats montrent un effet durable de l'intervention sur ces variables. On note également à T6 mois, des scores plus élevés de santé fonctionnelle qui n'étaient pas observables à T3 mois. En revanche, les effets de l'intervention sur la perception de l'environnement et le niveau d'activité physique observables à T3 mois ne sont plus observés à T6 mois. La chute des scores d'activité physique observée à T6 mois suggère une certaine dépendance des seniors vis-à-vis de l'accompagnement psychosocial. Ces résultats montrent également l'importance des relations entre l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique et la santé (Klusmann et al., 2012).

Discussion Générale

Ce travail doctoral, basé sur la théorie de l'internalisation des stéréotypes (Levy, 2009), a défendu la thèse selon laquelle les stéréotypes liés au vieillissement contribueraient à expliquer l'engagement des seniors dans l'activité physique. Cette thèse reposait sur le questionnement principal suivant : (a) quels sont les antécédents et les modérateurs de l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique ? ; (b) quelles sont leurs conséquences sur les comportements de santé et sur l'engagement dans l'activité physique des seniors ? ; et (c) quels sont les modérateurs des effets des stéréotypes sur le comportement ?

Un programme de recherche constitué de cinq études principales impliquant 667 participants a été réalisé afin d'apporter des éléments de réponse à notre questionnement. Différents types de devis (i.e., corrélationnel, transversal et longitudinal ; interventionnel ; expérimental) ainsi que différentes méthodes d'analyses (i.e., analyses factorielles, analyses de variance, modèles multi-niveaux)

ont été utilisés. Sur la base des résultats obtenus, nous pouvons tirer plusieurs conclusions.

Développer un outil psychométrique valide permettant de mesurer le contenu des stéréotypes liés au vieillissement dans le domaine de l'activité physique est apparu comme une première nécessité. En effet, les études antérieures sur les barrières psychologiques à l'activité physique chez les seniors suggèrent que les stéréotypes pourraient y jouer un rôle (e.g.. Booth et al., 2002 ; Netz et al., 2008 ; Vlachopoulos et al., 2010). Bien que plusieurs mesures des stéréotypes liés au vieillissement existent dans la littérature (e.g., Kruse & Schmitt, 2006 ; Palmore, 1990), aucune échelle mesurant spécifiquement ces stéréotypes dans le domaine de l'activité physique n'existait. Nous avons donc, dans un premier temps, apporté une contribution à un programme de recherche visant à développer et valider un questionnaire mesurant les stéréotypes liés au vieillissement dans le domaine de l'activité physique. Trois catégories de stéréotypes ont été mis en évidence : (a) les stéréotypes relatifs à l'auto-efficacité des seniors ; (b) les stéréotypes relatifs aux bénéfices de l'activité physique pour les seniors ; et (c) les stéréotypes relatifs aux risques de l'activité physique pour les seniors. La contribution au développement et à la validation de ce questionnaire nous a permis par la suite d'étudier le rôle de l'internalisation des stéréotypes liés au vieillissement (Levy, 2009) dans l'activité physique des seniors.

Quels sont les antécédents et les conséquences de l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique ?

Basées sur le modèle du *stereotype embodiment* de Levy (2009), plusieurs études antérieures ont montré que l'internalisation des stéréotypes liés au

vieillissement pouvait affecter les comportements de santé (e.g., Levy & Leifheit-Limson, 2009 ; Levy & Myers, 2004 ; Levy et al., 2002). Dans la continuité de ces travaux, nous avons émis l'hypothèse selon laquelle l'internalisation des stéréotypes liés au vieillissement dans le domaine de l'activité physique serait associée au niveau d'activité physique des seniors. L'objectif de la deuxième étude de notre travail doctoral a donc été d'identifier le rôle des antécédents de l'adhésion aux stéréotypes liés au vieillissement sur le niveau d'activité physique des seniors. Les résultats de cette étude ont indiqué que l'ouverture aux expériences et les théories implicites de l'habileté étaient des corrélats personnels de l'adhésion aux stéréotypes liés au vieillissement, et étaient reliés au niveau d'activité physique. Ces résultats suggèrent que ces antécédents psychosociaux seraient d'importants prédicteurs de l'adhésion aux stéréotypes liés au vieillissement, qui seraient à leur tour un facteur primordial de l'engagement dans une activité physique des seniors. Ces résultats sont également consistants avec les études existantes montrant que les stéréotypes liés au vieillissement pouvaient avoir des conséquences sur l'adoption de comportements de santé (e.g., Levy & Myers, 2004).

Afin de dépasser les limites liées au caractère transversal de cette étude, nous avons adopté un devis longitudinal pour notre troisième étude. L'objectif était d'examiner les relations entre les stéréotypes liés au vieillissement dans le domaine de l'activité physique et des variables de santé. Cette étude a révélé que l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique prédisait la santé perçue par le biais de la vitalité subjective, et ce indépendamment des perceptions de son vieillissement. Cette étude suggère l'existence de voies d'influence des stéréotypes autres que celle liée à l'intériorisation dans le Soi, que nous avons ici interprété en termes d'*ego depletion*. Ainsi, plus les participants percevaient des

bénéfices à l'activité physique et se sentaient capables d'être physiquement actifs, plus ils avaient de la vitalité au cours du temps. Cette étude suggère que les stéréotypes liés au vieillissement affecteraient différemment la vitalité en fonction de leur contenu spécifique, et considère l'*ego depletion* comme une voie complémentaire à l'internalisation des stéréotypes.

Comment modifier les stéréotypes liés au vieillissement dans le domaine de l'activité physique ?

Bien que les stéréotypes liés au vieillissement soient très répandus, et connus pour être stables, résistants, et difficiles à changer (Cuddy et al., 2005), de nombreuses stratégies permettant de les rendre malléables sont recensées dans la littérature scientifique (Blair, 2002), comme la suppression des stéréotypes (e.g., Macrae et al., 1994) ou l'activation de contre-stéréotypes (Blair & Banaji, 1996). De plus, plusieurs études ont montré l'efficacité d'interventions basées sur l'activité physique sur l'évolution des perceptions et les attitudes liés au vieillissement (e.g., Klusmann et al., 2012). Toutefois, ces travaux ne concernent pas spécifiquement la malléabilité des stéréotypes liés au vieillissement dans le domaine de l'activité physique. Dans la quatrième étude de notre thèse, nous nous sommes donc demandés dans quels contextes (i.e., stéréotypique *vs*. contre stéréotypique) les théories implicites de l'habileté étaient les plus bénéfiques sur la performance à une tâche de force musculaire. Des messages reposant sur des informations contre-stéréotypiques en lien avec le vieillissement, et sur les théories implicites de l'habileté relatives à la force musculaire des seniors ont été délivrés aux participants avant la réalisation d'un tâche de force. Les résultats obtenus ont montré que les théories incrémentielles étaient plus bénéfiques sur les performances des seniors que les

théories de l'entité lorsqu'elles sont associées à des informations contre-stéréotypiques. Ces résultats sont consistants avec les études montrant le caractère adaptatif des théories incrémentielles de l'habileté sur la performance motrice (e.g., Da Fonseca et al., 2008). Ces résultats suggèrent également que des interventions reposant sur le développement du sentiment de compétence et de contrôle, et la délivrance d'informations contre-stéréotypiques seraient à même de modifier favorablement les stéréotypes liés à l'activité physique chez les seniors.

Dans la dernière étude de notre travail doctoral, nous avons examiné les effets d'un programme d'activité physique adaptée combiné à une intervention psychosociale (incluant des informations contre-stéréotypiques, un apport de connaissances sur les bienfaits de l'activité physique, et du soutien social) sur les stéréotypes liés au vieillissement dans le domaine de l'activité physique. Les résultats ont montré que les seniors qui ont bénéficié du programme combinant activité physique et intervention psychosociale avaient rapporté des scores plus élevés de stéréotypes liés aux bénéfices de l'activité physique pour la santé et des scores plus faibles de stéréotypes relatifs aux risques de l'activité physique pour la santé, mais également des scores plus élevés de perceptions physiques de soi, de qualité de vie, et d'endurance physique comparativement au groupe contrôle. Ces résultats suggèrent que les stéréotypes liés au vieillissement dans le domaine de l'activité physique pourraient être améliorés chez des seniors sédentaires grâce à une intervention adaptée. Cette étude met en lumière et confirme le caractère malléable des stéréotypes liés au vieillissement dans le domaine de l'activité physique.

Limites et perspectives

Bien que nous ayons pris des précautions théoriques et méthodologiques, ce travail doctoral comporte certaines limites dont nous devons tenir compte dans l'interprétation de nos résultats. En premier lieu, des limites méthodologiques liées aux mesures auto-rapportées peuvent être identifiées. En effet, nos études ont le plus souvent utilisé des questionnaires pour mesurer les variables d'intérêt, notamment le niveau d'activité physique (i.e., mesures subjectives). Ces méthodes classiques présentent l'inconvénient de conditionner les réponses des individus (i.e., échelle de Likert). De plus, les réponses obtenues pourraient être biaisées par des problèmes de désirabilité sociale (i.e., tendance à se présenter favorablement vis-à-vis des normes sociales ; Fisher, 1993). Une autre limite importante concerne la population étudiée. D'une part, il faut noter la prédominance de femmes, et le niveau d'éducation élevé des participants dans l'ensemble des travaux de recherche ; d'autre part, nos études n'ont porté que sur des seniors autonomes. De ce fait, la généralisation de nos résultats à des personnes âgées masculines ou plus fragiles n'est pas envisageable. Par ailleurs, les résultats restent limités par le choix des variables retenues. Ainsi, dans l'étude 2, les antécédents psychosociaux ne sauraient se résumer aux construits de l'ouverture aux expériences, et des théories implicites de l'habileté. Dans la même veine, nous avons fait le choix dans l'étude 4 de mesurer la force musculaire à l'aide d'un handgrip sur des seniors actifs, ce qui restreint nos résultats à cette variable comportementale, et à cette population. Enfin, le programme d'activité physique mis en place dans l'étude 5 a reposé uniquement sur de la marche, et comme précisé plus haut, la population était uniquement composée de seniors sédentaires de sexe féminin.

Au-delà de ces limites, notre travail doctoral permet d'envisager plusieurs perspectives de recherche sur la question de l'influence des stéréotypes liés au vieillissement sur les comportements d'activité physique des seniors. Tout d'abord, dans la continuité de notre deuxième étude, il serait intéressant d'étudier d'autres variables explicatives de l'adhésion aux stéréotypes liés au vieillissement au sein de cette population. Par exemple, le rôle de variables de personnalité, tel que le névrosisme qui est connu pour être relié aux perceptions de soi et à la santé perçue des seniors (Moor et al., 2006), pourrait être examiné pour mieux comprendre les antécédents personnels de l'adhésion aux stéréotypes dans le domaine de l'activité physique. Nous pourrions également envisager d'étudier le rôle de variables motivationnelles largement utilisées dans le domaine de l'activité physique, comme la motivation autodéterminée (Deci & Ryan, 1985, 2000, 2002). En effet, de nombreuses études ont mis en évidence que la motivation autodéterminée était un facteur favorable au maintien de l'engagement dans une activité physique (Sarrazin et al., 2002), et plus particulièrement chez les seniors (Stephan et al., 2010). Par ailleurs, nous avons mis en évidence le rôle modérateur des informations contre-stéréotypiques (i.e., étude 4), ou encore de l'adhésion des stéréotypes liés au vieillissement (i.e., étude 2) sur les comportements de santé liés à l'activité physique. Nous pourrions également envisager l'effet modérateur des traits de personnalité. Par exemple, Rhodes et Dickau (2012) ont montré l'effet modérateur de l'extraversion dans la relation entre l'intention de pratiquer une activité physique et l'activité physique. Enfin, des modérateurs sociodémographiques tels que l'âge ou le sexe pourraient être étudiés, à l'image d'étude menée par Rhodes et Smith (2006).

En lien avec la théorie de l'internalisation des stéréotypes (Levy, 2009), nous pourrions également mettre en place une étude longitudinale dans la continuité de

l'étude 2. Ce devis nous permettrait de mieux comprendre la nature des relations entre l'adhésion aux stéréotypes liés au vieillissement et le niveau d'activité physique des seniors à travers le temps, d'examiner si ces stéréotypes sont internalisés par les seniors, et si leurs effets sur le niveau d'activité physique perdurent dans le temps. Nous pourrions ensuite renforcer les résultats des études 2 et 3, en utilisant des mesures comportementales telles que le test de marche de 6 minutes (e.g., *American Thoracic Society*, 2002 ; Solway et al., 2001) ou l'actimétrie, plutôt que des variables auto-rapportées de l'activité physique, pour recueillir ainsi une mesure plus objective de l'activité physique effectuée par les seniors. En outre, nous nous sommes principalement intéressés au cours de nos différentes études à la participation des seniors dans une activité physique. Cependant, d'autres variables en lien avec l'activité physique pourraient être prises en compte, telles que l'abandon d'une activité par les seniors. Toutes nos études ont mesuré des stéréotypes explicites (i.e., directs) qui permettaient d'identifier, pour un individu ou un groupe d'individus, les éléments associés à un stéréotype présents dans sa mémoire. Ainsi, nous pourrions envisager l'utilisation de méthodes d'accessibilité basées sur la mesure de stéréotypes implicites (i.e., indirects) dans lesquelles les participants n'auraient pas connaissance de ce qui est évalué, ne laissant ainsi aucun contrôle conscient à leurs réponses. En effet, nous pourrions examiner l'évolution de l'adhésion aux stéréotypes liés au vieillissement, mesuré implicitement chez les seniors.

Dans le contexte particulier de l'activité physique, il a été observé que l'activation de stéréotypes négatifs pouvait influencer négativement la performance physique des individus (Chalabaev et al., 2008). En nous appuyant sur ces précédents travaux, l'étude 4 a révélé que les théories incrémentielles étaient plus bénéfiques à la performance que les théories de l'entité, mais ceci uniquement dans un contexte où

des informations contre-stéréotypiques liées au vieillissement étaient données aux participants. Il serait donc intéressant d'utiliser un autre plan afin d'examiner les effets d'interaction entre les théories implicites de l'habileté (i.e., incrémentielles *vs.* entité) et le contexte stéréotypique (menace *vs.* non menace) sur la force musculaire ou sur d'autres capacités physiques, telles que l'équilibre ou la posture des seniors, afin d'étendre nos résultats, et de les comparer entre eux.

L'étude 5 a montré que des seniors participant à un programme d'activité physique adaptée (i.e., marche hebdomadaire) combiné à une intervention psychosociale maintiennent des scores élevés de stéréotypes relatifs aux bénéfices de l'activité physique, et d'endurance au cours du temps. Ces résultats suggèrent une dépendance des seniors vis-à-vis de l'accompagnement. De futurs travaux devront être poursuivis auprès d'un plus grand nombre de participants afin de confirmer nos résultats. Nous pourrions également envisager une autre activité physique que la marche, telle que la gymnastique douce, afin d'étendre ces résultats à d'autres activités physiques adaptées. Enfin, nous pourrions mettre en place d'autres stratégies visant à modifier les stéréotypes liés au vieillissement, comme par exemple, la focalisation de l'attention qui est connue pour prédire l'impact des stéréotypes sur les comportements (Blair, 2002) en empêchant l'activation automatique des stéréotypes (Spencer et al., 1998).

En conclusion, ce travail doctoral a permis de mieux identifier les antécédents psychosociaux, les conséquences, ainsi que les modérateurs de l'engagement dans l'activité physique chez les seniors. En effet, l'ouverture aux expériences ainsi que les théories implicites de l'habileté ont été identifiées comme des corrélats personnels de l'internalisation des stéréotypes liés au vieillissement. De plus, cette thèse confirme

que l'adhésion à ces stéréotypes prédit des variables liées à la santé, et plus particulièrement la vitalité subjective. Nous avons ensuite montré que les théories incrémentielles de l'habileté étaient plus efficaces lorsqu'elles sont associées à des informations contre-stéréotypiques. Enfin, cette thèse met en évidence l'importance de l'influence des stéréotypes liés au vieillissement dans la pratique d'une activité physique chez les seniors, et suggère qu'une intervention psychosociale adaptée permettrait de les modifier favorablement. En se basant sur les résultats de nos études, cette thèse ouvre de multiples perspectives dans le domaine de la promotion de l'activité physique chez cette population. En effet, l'élaboration de programmes d'activités physiques adaptées combinés à des messages contre-stéréotypiques semblent nécessaires pour limiter l'influence potentiellement néfaste des stéréotypes liés au vieillissement chez des seniors physiquement inactifs et actifs.

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Résumé - Les bienfaits d'une activité physique régulière sur la santé des seniors sont bien établis dans la littérature. Cependant, cette population n'est pas suffisamment active au regard des recommandations actuelles. L'approche adoptée dans cette thèse est que cette inactivité physique serait due en partie à des barrières psychologiques, et plus particulièrement aux stéréotypes liés au vieillissement. L'objectif de ce travail doctoral est d'identifier le rôle de ces stéréotypes dans le domaine de l'activité physique des seniors. En se basant sur la théorie de l'internalisation des stéréotypes (i.e. *stereotype embodiment theory* ; Levy, 2009), nous défendons la thèse que les stéréotypes liés au vieillissement affectent les comportements des seniors vis-à-vis de l'activité physique. Le programme de recherche est constitué de cinq études, la première étude est la continuité de l'élaboration et de la validation d'un outil psychométrique mesurant les stéréotypes liés à la pratique de l'activité physique chez les seniors (*Aging Stereotypes and Exercise Scale* ; ASES). La deuxième étude a montré que l'ouverture aux expériences et les théories implicites de l'habileté sont des corrélats personnels de l'internalisation des stéréotypes liés au vieillissement, et sont reliés au niveau d'activité physique des seniors. La troisième étude montre que l'adhésion aux stéréotypes liés au vieillissement dans le domaine de l'activité physique prédit la santé par d'autres voies d'influence que l'intériorisation, notamment en diminuant l'énergie mentale (i.e., vitalité subjective) de seniors actifs, illustrant ainsi un effet *d'ego depletion*. La quatrième étude suggère que les théories incrémentielles sont plus efficaces sur une tâche liée aux capacités physiques lorsqu'elles sont associées à des informations contre-stéréotypées. Enfin, la dernière étude de ce travail doctoral, est une étude interventionnelle révélant que les seniors ayant bénéficié d'un programme de marche hebdomadaire supervisée et individualisée, et d'une intervention psychosociale, ont obtenu des scores plus élevés de stéréotypes relatifs aux bénéfices de l'activité physique pour la santé, de perceptions de la valeur physique, de la compétence sportive, de l'apparence physique, de la qualité de vie et d'endurance physique, et des scores plus faibles de stéréotypes relatifs aux risques de l'activité physique pour la santé. En d'autres termes, ces résultats indiquent que les stéréotypes personnels ont évolué positivement chez des femmes seniors sédentaires grâce à une intervention adaptée, apportant ainsi un appui à une conception malléable des stéréotypes. Cette thèse montre l'importance de l'influence des stéréotypes liés au vieillissement dans la pratique de l'activité physique chez les seniors, et l'intérêt d'un programme d'activité physique combiné à un apport de connaissances et d'informations contre-stéréotypiques.

Mots-clés : seniors, activité physique, stéréotypes liés au vieillissement, perceptions de soi.

Abstract – The beneficial effects of regular physical activity on the health of older adults have been well-documented in the literature. However, this population is not sufficiently active against the current recommendations. The approach adapted in this thesis was that physical inactivity was partly due to psychological barriers, notably aging stereotypes. The main objective of this doctoral work was to identify the role of these stereotypes in physical activity domain among older adults. Based on the internalization of stereotypes theory (i.e., *Stereotype Embodiment Theory*, Levy, 2009), we defend the thesis that aging stereotypes affect older adults' health-behaviors. The research program consists of five studies. In the first study, we contribute to the validation of a psychometric tool which measuring aging stereotypes in the physical activity domain (*Aging Stereotypes and Exercise Scale*; ASES). The second study highlights that openness to experience and implicit theories of ability are personal correlates of internalization of aging stereotypes, and are linked to the level of physical activity among older adults. The third study reveals that endorsement of aging stereotypes in physical activity domain predicted health though other pathways than their internalization into the self, including lowering the mental energy (i.e., subjective vitality) among active older adults, and possibly through ego depletion effects. The fourth study suggests that incremental theories of ability are more effective on a task related to the physical capacities when counter-stereotypical information is given. The last study of this thesis, interventional nature, shows that older adults who participated on exercise program combined with psychosocial intervention report higher scores of stereotypes related to benefits of the physical activity, physical self-perceptions, quality of life and physical endurance, and lower scores of stereotypes relative to risks of physical activity. In other words, these results indicate that personal stereotypes evolved positively among women older sedentary through appropriate intervention, and providing support to a malleable design stereotypes. This dissertation highlights the role of aging stereotype in the practice of physical activity among older adults, and suggests the interest of physical activity program combined with a contribution of knowledge, and counter-stereotypical information.

Key words: elderly, physical activity, aging stereotypes, self-perceptions of aging